STIC SEARCH REQUEST FOR 10/079,816
CANTELMO 571 272 1283

ADDITIONAL SEARCH INFORMATION:

Claims broadly drawn to a carbon carrier having particles (metal, metal alloy or metal oxide as specified in claim 1 above) formed on the carbon carrier.

Synonyms

Carrier ... base, core, support, substrate
Particles ... grains, granules
Carbon ... graphite, fullerene, nanotube
Particles ... numerous combinations of the materials set forth above
    also look for the generic formulas AB5, AB, A2B, AB2
    where A and B are at least 2 of the metal constituents
    in the claim.

Also look for PVD, physical vapor (vapour) deposition or sputtering of the metal, metal alloy or metal oxide materials of claim 1 without using the term particles, grains or granules (the process inherently generates particles).

```
=> file reg
FILE 'REGISTRY' ENTERED AT 16:03:35 ON 03 FEB 2004
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=> display history full l1-

     FILE 'REGISTRY' ENTERED AT 14:12:29 ON 03 FEB 2004
                E CARBON/CN
L1            1 SEA CARBON/CN
L2         2285 SEA ?FULLEREN?/CNS AND 1/ELC.SUB
                E HYDROGEN/CN
L3            1 SEA HYDROGEN/CN
                E VANADIUM/CN
L4            1 SEA VANADIUM/CN
                E NIOBIUM/CN
L5            1 SEA NIOBIUM/CN
                E TANTALUM/CN
L6            1 SEA TANTALUM/CN
                E TITANIUM/CN
L7            1 SEA TITANIUM/CN
                E ZIRCONIUM/CN
L8            1 SEA ZIRCONIUM/CN
                E HAFNIUM/CN
L9            1 SEA HAFNIUM/CN
                E LANTHANUM/CN
L10           1 SEA LANTHANUM/CN
                E CERIUM/CN
L11           1 SEA CERIUM/CN

     FILE 'LREGISTRY' ENTERED AT 14:21:52 ON 03 FEB 2004
L12         694 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA)/ELS)
                (L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS AND
                AYS/CI
L13         943 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA OR
                AL)/ELS) (L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS
                AND AYS/CI

     FILE 'REGISTRY' ENTERED AT 14:32:20 ON 03 FEB 2004
L14      358356 SEA ((MG OR TI)/ELS OR LNTH/PG OR (ZR OR V OR CA OR
                AL)/ELS) (L) (FE OR CO OR NI OR CU OR MN OR MO OR W)/ELS
                AND AYS/CI
L15      177590 SEA L14 NOT AL/ELS
L16      180766 SEA L14 NOT L15
L17         297 SEA (CU(L)O)/ELS (L) 2/ELC.SUB
L18         174 SEA (MN(L)O)/ELS (L) 2/ELC.SUB
```

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L19            107 SEA (SN(L)O)/ELS (L) 2/ELC.SUB
L20            110 SEA (ZN(L)O)/ELS (L) 2/ELC.SUB
L21            522 SEA (V(L)O)/ELS (L) 2/ELC.SUB
L22            373 SEA (TI(L)O)/ELS (L) 2/ELC.SUB
L23            193 SEA (CO(L)O)/ELS (L) 2/ELC.SUB
L24            392 SEA (FE(L)O)/ELS (L) 2/ELC.SUB

     FILE 'HCA' ENTERED AT 14:50:59 ON 03 FEB 2004
L25          66665 SEA (L3 OR HYDROGEN# OR H2 OR H)(2A)(STORE# OR STORING#
                   OR STORAG? OR ABSORB? OR ABSORP? OR ADSORB? OR ADSORP?
                   OR CHEMICOSORB? OR CHEMICOSORP? OR CHEMISORB? OR
                   CHEMISORP? OR SORB?)

     FILE 'LCA' ENTERED AT 14:51:02 ON 03 FEB 2004
L26           1094 SEA L1 OR L2 OR CARBONACEOUS? OR CARBONIFEROUS? OR
                   ?FULLEREN? OR CARBONBLACK? OR BONEBLACK? OR LAMPBLACK?
                   OR CHIMNEYBLACK? OR CHANNELBLACK? OR NORIT# OR (ACT# OR
                   ACTIVAT?)(2A)(CARBON# OR C OR CHARCOAL?) OR BLACK?(2A)(LA
                   MP? OR CHANNEL? OR CHIMNEY? OR BONE# OR CARBON# OR C)
L27            106 SEA (CARBON# OR C)(2A)(SUPPORT? OR SUBSTRAT? OR BED OR
                   BEDS OR BEDDED OR BEDDING# OR BASE# OR CARRIER? OR
                   CORE#)

     FILE 'REGISTRY' ENTERED AT 14:58:21 ON 03 FEB 2004
                   E GRAPHITE/CN
L28              1 SEA GRAPHITE/CN

     FILE 'LCA' ENTERED AT 14:58:35 ON 03 FEB 2004
L29            633 SEA L28 OR GRAPHIT? OR NANOTUBE# OR NANOTUBING# OR
                   NANOTUBUL? OR NANOROD? OR NANO(2A)(TUBE# OR TUBING# OR
                   TUBUL? OR ROD OR RODS)

     FILE 'HCA' ENTERED AT 15:01:08 ON 03 FEB 2004
L30         659156 SEA L26 OR L27 OR L29
L31          78861 SEA L4
L32          59180 SEA L5
L33          46366 SEA L6
L34         141959 SEA L7
L35          63794 SEA L8
L36          20054 SEA L9
L37          43461 SEA L10
L38          47934 SEA L11
L39         148693 SEA L15
L40         213320 SEA L16
L41           1127 SEA ((L17 OR L18 OR L19 OR L20 OR L21 OR L22 OR L23 OR
                   L24))(3A)(SEMICOND? OR SEMI(2A)(COND? OR CONDUCT?))
L42           9444 SEA PVD OR (PHYS# OR PHYSICAL?)(3A)(VAPOR? OR VAPOUR?)(3A
                   )DEPOSIT?
```

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L43      139465 SEA SPUTTER? OR (GLOW? OR ARC OR SPARK?)(2A)DISCHARG?
L44        4961 SEA L25 AND L30
L45          87 SEA L44 AND (L42 OR L43)
L46           0 SEA L45 AND L42
L47          87 SEA L45 AND L43
L48           8 SEA L45 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
                L37 OR L38 OR L39 OR L40))
L49           0 SEA L45 AND L41
L50           0 SEA L44 AND L41
L51         433 SEA L44 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
                L37 OR L38 OR L39 OR L40))
L52         184 SEA L44 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
                L37 OR L38))
L53         284 SEA L44 AND (L39 OR L40)
L54           8 SEA (L52 OR L53) AND (L42 OR L43)
L55       98498 SEA AB5 OR AB OR A2B OR AB2
L56          79 SEA L44 AND L55
L57        3228 SEA AB5 OR A2B OR AB2
L58          23 SEA L44 AND L57

     FILE 'LCA' ENTERED AT 15:41:32 ON 03 FEB 2004
L59        5586 SEA (PARTICL? OR MICROPARTICL? OR PARTICULAT? OR DUST?
                OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT? OR
                SMUT? OR FINES# OR PRILL? OR FLAKE# OR PELLET? OR
                BB#)/BI,AB

     FILE 'HCA' ENTERED AT 15:48:39 ON 03 FEB 2004
L60      197597 SEA FINES OR NANOPARTICL? OR MICROPARTICL? OR (FINE# OR
                SMALL? OR TINY OR LITTLE? OR MINISCUL? OR NANO OR MICRO
                OR MICROSCOP?)(2A)(PARTICL? OR PARTICULAT? OR DUST? OR
                GRIT? OR GRAIN## OR POWDER?)
L61         123 SEA L44 AND L60
L62           6 SEA L61 AND (L42 OR L43)
L63           7 SEA L61 AND ((L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR
                L37 OR L38))
L64          10 SEA L61 AND (L39 OR L40)
L65           0 SEA L61 AND L41

     FILE 'LCA' ENTERED AT 15:57:54 ON 03 FEB 2004
L66          22 SEA (FINE# OR SMALL? OR TINY OR LITTLE? OR MINISCUL? OR
                NANO OR MICRO OR MICROSCOP?)(2A)GRANUL?

     FILE 'HCA' ENTERED AT 16:00:18 ON 03 FEB 2004
L67        7228 SEA (FINE# OR SMALL? OR TINY OR LITTLE? OR MINISCUL? OR
                NANO OR MICRO OR MICROSCOP?)(2A)GRANUL?
L68           1 SEA L44 AND L67
L69          28 SEA L48 OR L54 OR L62 OR L63 OR L64 OR L68
L70          23 SEA L58 NOT L69
```

=> file hca
FILE 'HCA' ENTERED AT 16:03:54 ON 03 FEB 2004
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=> d l69 1-28 cbib abs hitstr hitind

L69 ANSWER 1 OF 28 HCA COPYRIGHT 2004 ACS on STN
139:151782 Method for producing hydrogen occlusion material. Tsuboi, Toshiyuki (Futaba Corporation, Japan). U.S. US 6602485 B1 20030805, 5 pp. (English). CODEN: USXXAM. APPLICATION: US 2000-619651 20000719.

AB A hydrogen occlusion material producing method capable of producing a hydrogen occlusion material during prepn. of a **carbonaceous** material such as carbon **nanotubes** or the like. A gas atm. at a predetd. pressure is formed in a chamber and then a DC current is fed to a pair of carbon electrodes from a discharge power unit while keeping the carbon electrodes spaced from each other at a predetd. interval through a pair of position control units, leading to **arc discharge**. This results in an anode constituted by platinum metal which exhibits both a catalytic function during prepn. of carbon **nanotubes** and a function of dissocg. hydrogen mols. into hydrogen atoms being heated, to thereby produce soot. The soot contains a large amt. of hydrogen occlusion material wherein **fine particles** of the platinum metal are uniformly adhered to single-layer carbon **nanotubes**, resulting in being used for a hydrogen occlusion material.

IT **7439-91-0**, Lanthanum, uses **7440-45-1**, Cerium, uses
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)

RN 7439-91-0 HCA
CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-45-1 HCA
CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

IC ICM C01B031-02
NCL 423445000R; 423445000B; 423447100
CC 49-1 (Industrial Inorganic Chemicals)
ST hydrogen occlusion material carbon **nanotube** **fullerene**
IT Electrodes
Nanotubes
(carbon; method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT **Absorbents**
(**hydrogen** occlusion material; method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT Electric arc
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT **Carbonaceous** materials (technological products)
Fullerenes
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT Anodes
(platinum; method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT Iridium alloy, base
Osmium alloy, base
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT 7429-91-6, Dysprosium, uses 7439-89-6, Iron, uses **7439-91-0**, Lanthanum, uses 7439-94-3, Lutetium, uses 7440-00-8, Neodymium, uses 7440-02-0, Nickel, uses 7440-06-4, Platinum, uses 7440-10-0, Praseodymium, uses 7440-18-8, Ruthenium, uses 7440-27-9, Terbium, uses **7440-45-1**, Cerium, uses 7440-48-4, Cobalt, uses 7440-52-0, Erbium, uses 7440-54-2, Gadolinium, uses 7440-60-0, Holmium, uses 7440-65-5, Yttrium, uses
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT 7440-05-3, Palladium, uses 7440-16-6, Rhodium, uses
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)
IT 1333-74-0, Hydrogen, processes

(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)

IT 1314-08-5, Palladium oxide 7439-88-5, Iridium, uses 7440-04-2, Osmium, uses 12030-49-8, Iridium oxide 12680-36-3, Rhodium oxide 20816-12-0, Osmium oxide
(method for producing hydrogen occlusion material from **carbonaceous** materials such as carbon **nanotubes** or **fullerene**)

L69 ANSWER 2 OF 28 HCA COPYRIGHT 2004 ACS on STN
139:142660 Synthesis, argon/**hydrogen storage** and magnetic properties of boron nitride **nanotubes** and nanocapsules. Oku, Takeo; Kuno, Masaki (Institute of Scientific and Industrial Research, Osaka University, Ibaraki, Osaka, 567-0047, Japan). Diamond and Related Materials, 12(3-7), 840-845 (English) 2003. CODEN: DRMTE3. ISSN: 0925-9635. Publisher: Elsevier Science B.V..

AB BN **fullerene** materials such as **nanotubes**, nanocapsules and nanocages were synthesized from LaB6, Co, Pd, Ti, Ni or Cu catalyst with boron powder by using an arc-melting method under an Ar-N atm.. For the BN nanocapsules with Co and CoOx **nanoparticles**, argon was detected by energy dispersive x-ray spectroscopy, and the nanocapsules had superparamagnetic properties. Thermogravimetry/differential thermogravimetric anal. of BN nanomaterials produced from LaB6 and Pd/boron powder showed the possibility of **hydrogen storage** of .apprx.3 wt.%.

IT **7440-32-6**, Titanium, processes
(in arc synthesis, argon/**hydrogen storage** and magnetic properties of boron nitride **nanotubes** and nanocapsules)

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 78-5 (Inorganic Chemicals and Reactions)
ST boron nitride **nanotube** nanocapsule synthesis property use
IT Magnetism
Nanostructures
Nanotubes
(arc synthesis, argon/**hydrogen storage** and magnetic properties of boron nitride **nanotubes** and nanocapsules)

IT Catalysts
(in arc synthesis, argon/**hydrogen storage** and

magnetic properties of boron nitride **nanotubes** and
nanocapsules)
IT 1333-74-0, Hydrogen, processes 7440-37-1, Argon, processes
(arc synthesis, argon/**hydrogen storage** and
magnetic properties of boron nitride **nanotubes** and
nanocapsules)
IT 7440-02-0, Nickel, processes 7440-05-3, Palladium, processes
7440-32-6, Titanium, processes 7440-42-8, Boron, processes
7440-48-4, Cobalt, processes 7440-50-8, Copper, processes
7727-37-9, Nitrogen, processes 11104-61-3, Cobalt oxide
12008-21-8, Lanthanum boride lab6
(in arc synthesis, argon/**hydrogen storage** and
magnetic properties of boron nitride **nanotubes** and
nanocapsules)

L69 ANSWER 3 OF 28 HCA COPYRIGHT 2004 ACS on STN
139:27686 Suppression of **hydrogen absorption** to
V-4Cr-4Ti alloy by TiO2/TiC coating. Hirohata, Y.; Motojima, D.;
Hino, T.; Sengoku, S. (Department of Nuclear Engineering, Hokkaido
University, Kita-13,, Nishi-8, Kita-ku, Sapporo, 060-8628, Japan).
Journal of Nuclear Materials, 313-316, 172-176 (English) 2003.
CODEN: JNUMAM. ISSN: 0022-3115. Publisher: Elsevier Science B.V..
AB Ti oxide film was coated on the surface of a V-4Cr-4Ti alloy to
reduce **H absorption** at low temp. region. Ti
oxide was deposited by radiofrequency reactive magnetron
sputtering with a Ti target using O as **sputter**
gas. The film consisted of a mixt. of TiO2 and TiC. The content of
TiO2 was .apprx.80%. The at. compn. remained the same in the temp.
range <873 K. The film thickness also remained the same in the
temp. region <773 K. At the temp. >973 K, the O concn. decreased
due to diffusion into the bulk of V-alloy, and the C concn.
increased due to diffusion from the bulk of V-alloy. The **H
absorption** rate of Ti-oxide coated V-alloy decreased with
increase of the film thickness. In the case of the film with the
thickness of 0.5 .mu.m, the absorption rate was much smaller than
that of noncoated V-alloy at the absorption temp. of 573 K.
Information is applicable to embrittlement of fusion reactor
materials.
IT **7440-32-6**, Titanium, processes **7440-44-0**, Carbon,
processes **7440-62-2**, Vanadium, processes
(in study of **hydrogen absorption** to vanadium
alloy)
RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

CC 71-2 (Nuclear Technology)
Section cross-reference(s): 56
ST **hydrogen absorption** fusion reactor embrittlement vanadium alloy
IT Embrittlement
(**hydrogen absorption** to vanadium alloy in relation to)
IT Diffusion
(in relation to **hydrogen absorption** to vanadium alloy)
IT Heat treatment
(in study of **hydrogen absorption** to vanadium alloy)
IT **Absorption**
(suppression of **hydrogen absorption** to vanadium alloy by TiO2/TiC coating)
IT Fusion reactors
(suppression of **hydrogen absorption** to vanadium alloy by TiO2/TiC coating for application to)
IT Magnetron **sputtering**
(suppression of **hydrogen absorption** to vanadium alloy by TiO2/TiC coating using)
IT **7440-32-6**, Titanium, processes **7440-44-0**, Carbon, processes **7440-62-2**, Vanadium, processes 7727-37-9, Nitrogen, processes 7782-44-7, Oxygen, processes
(in study of **hydrogen absorption** to vanadium alloy)
IT 220103-18-4, NIFS HEAT 1
(suppression of **hydrogen absorption** to vanadium alloy)
IT 12070-08-5, Titanium carbide (TiC) 13463-67-7, Titanium oxide (TiO2), uses
(suppression of **hydrogen absorption** to vanadium alloy by TiO2/TiC coating)
IT 1333-74-0, Hydrogen, processes
(suppression of **hydrogen absorption** to

vanadium alloy by TiO2/TiC coating)

L69 ANSWER 4 OF 28 HCA COPYRIGHT 2004 ACS on STN
138:371658 **Hydrogen storage** in carbon nanostructures. Tarasov, Boris P.; Shul'ga, Yuriy M.; Lobodyuk, Oleksander O.; Onipko, Oleksiy (Institute of Problems of Chemical Physics, RAS, Chernogolovka, Russia). Proceedings of SPIE-The International Society for Optical Engineering, 4806(Complex Mediums III: Beyond Linear Isotropic Dielectrics), 197-206 (English) 2002. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB Magnetization curves in the fields .ltoreq.10 kOe measured for powders produced by elec. arc **sputtering** at **graphite**-Co-Ni electrodes. It was ascertained that magnetic properties of powders essentially depend on the place of their deposition within a spray chamber. The deposition growing on the cathode is basically a diamagnetic material while the rest of the products after **sputtering** is ferromagnetic. Their ferromagnetism is conditioned by Co-Ni **nanoparticles**. Some of them are encapsulated into the carbon shell that preserves those particles from oxidn. by air and dissoln. in HCl.

IT **7782-42-5, Graphite,** processes
(**H2 storage** in C nanostructured powders obtained by **sputtering** using **graphite**-Co-Ni electrodes)

RN 7782-42-5 HCA

CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **7440-44-0,** Carbon, uses
(**H2 storage** in C nanostructured powders obtained by **sputtering** using **graphite**-Co-Ni electrodes)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 77

ST carbon nanopowder **graphite** cobalt nickel **sputtering hydrogen storage**

IT Electrodes
Energy **storage**
Nanostructures

Sputtering
(**H2 storage** in C nanostructured powders
obtained by **sputtering** using **graphite**-Co-Ni
electrodes)
IT Coercive force (magnetic)
Magnetization
(**H2 storage** in C nanostructured powders
obtained by **sputtering** using **graphite**-Co-Ni
electrodes and characterized via)
IT 7440-02-0, Nickel, processes 7440-48-4, Cobalt, processes
7782-42-5, Graphite, processes 11101-13-6
(**H2 storage** in C nanostructured powders
obtained by **sputtering** using **graphite**-Co-Ni
electrodes)
IT **7440-44-0**, Carbon, uses
(**H2 storage** in C nanostructured powders
obtained by **sputtering** using **graphite**-Co-Ni
electrodes)
IT 1333-74-0, **Hydrogen**, uses
(**H2 storage** in C nanostructured powders
obtained by **sputtering** using **graphite**-Co-Ni
electrodes)

L69 ANSWER 5 OF 28 HCA COPYRIGHT 2004 ACS on STN
138:174581 **Core**-shell **carbon** nanofiber materials for
hydrogen storage and their preparation. Huang,
Houjin; Ata, Masafumi; Yamada, Atsuo; Tsutsui, Shigemitsu (Sony
Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2003054901 A2 20030226, 36
pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-245479
20010813.
AB The title materials consist of a slit-pore carbon nanofiber having
graphite planes disposed parallel to one another around a
central hole, with the **hydrogen stored** in
between the **graphite** planes and the central hole contg.
hydrogen storage materials of 10-90 vol.% content
or those showing higher (vol.%) **H storage**
capacity. The materials are manufd. by generation of **arc
discharge** between a bowl-shaped **graphite** cathode
and a C-contg. anode in presence of and 10-90 wt.% (**based**
on **C**-contg. materials in anode and catalysts) catalyst
selected from Li, Ni, Mg, Al, Ti, V, Nb, Ga, In, Fe, Ir, Rh, Ru, Pt,
Se, Sc, Y, La, Ce, Pr, Nd, Gd, Mi-La, Mg-Ni, Mg-Ce, Ca-Ni, Na-Al,
Ni-Ce, and Ti-Fe-C and optionally in presence of source gases, e.g.
CO, CH4, CH2CH2. Lightwt. and safe **H-absorbing**
materials are manufd. easily at low cost.
IT **7782-42-5, Graphite**, uses
(cathode; manuf. of **core**-shell **carbon**
nanofiber materials for **hydrogen storage** by

arc discharging of **graphite** cathode
bowls in presence of catalysts)
RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **7439-91-0**, Lanthanum, uses **7440-03-1**, Niobium, uses **7440-32-6**, Titanium, uses **7440-44-0**, Carbon, uses **7440-45-1**, Cerium, uses **7440-62-2**, Vanadium, uses **12683-37-3** **54259-32-4** **55502-00-6** **56944-09-3**
(manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)
RN 7439-91-0 HCA
CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-03-1 HCA
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 7440-45-1 HCA
CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

RN 7440-62-2 HCA

CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 12683-37-3 HCA
CN Magnesium alloy, nonbase, Mg,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
Mg	7439-95-4
Ni	7440-02-0

RN 54259-32-4 HCA
CN Cerium alloy, nonbase, Ce,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
Ce	7440-45-1
Ni	7440-02-0

RN 55502-00-6 HCA
CN Carbon alloy, nonbase, C,Fe,Ti (9CI) (CA INDEX NAME)

Component	Component Registry Number
C	7440-44-0
Fe	7439-89-6
Ti	7440-32-6

RN 56944-09-3 HCA
CN Calcium alloy, nonbase, Ca,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
Ca	7440-70-2
Ni	7440-02-0

IC ICM C01B003-00
ICS B01J020-20; B82B001-00; B82B003-00; C01B031-02; D01F009-127
CC 57-8 (Ceramics)
Section cross-reference(s): 49, 52
ST **hydrogen absorbing core** shell
carbon nanofiber; **arc discharge** manuf

slit pore carbon nanofiber

IT Nanofibers
(carbon, slit-pore type; manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT Electric arc
(manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT Carbon fibers, preparation
(nano-, slit-pore type; manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT **7782-42-5**, **Graphite**, uses
(cathode; manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT 7429-90-5, Aluminum, uses 7439-88-5, Iridium, uses 7439-89-6, Iron, uses **7439-91-0**, Lanthanum, uses 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7439-98-7, Molybdenum, uses 7440-00-8, Neodymium, uses 7440-02-0, Nickel, uses **7440-03-1**, Niobium, uses 7440-06-4, Platinum, uses 7440-10-0, Praseodymium, uses 7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses 7440-20-2, Scandium, uses 7440-31-5, Tin, uses **7440-32-6**, Titanium, uses 7440-42-8, Boron, uses **7440-44-0**, Carbon, uses **7440-45-1**, Cerium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-54-2, Gadolinium, uses 7440-55-3, Gallium, uses 7440-56-4, Germanium, uses **7440-62-2**, Vanadium, uses 7440-65-5, Yttrium, uses 7440-66-6, Zinc, uses 7440-74-6, Indium, uses 7782-49-2, Selenium, uses 8049-20-5, Misch metal **12683-37-3** **54259-32-4** **55502-00-6** **56944-09-3** 103256-65-1 107529-34-0
(manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT 1333-74-0, Hydrogen, miscellaneous
(manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

IT 74-82-8, Methane, reactions 74-85-1, Ethene, reactions 630-08-0, Carbon monoxide, reactions

(manuf. of **core**-shell **carbon** nanofiber materials for **hydrogen storage** by **arc discharging** of **graphite** cathode bowls in presence of catalysts)

138:41667 Carbon **nanotube** production by a cracking of liquid hydrocarbons. Ryzhkov, Vladislav A. (Research and Development Director, Rosseter Holdings Ltd, Limassol, 3310, Cyprus). Physica B: Condensed Matter (Amsterdam, Netherlands), 323(1-4), 324-326 (English) 2002. CODEN: PHYBE3. ISSN: 0921-4526. Publisher: Elsevier Science B.V..

AB Carbon **nanotube** products (MWNTs, SWNTs, SWNHs, and polyhedral **nanoparticles**) are derived from **carbonaceous** deposits formed by a cracking of liq. hydrocarbons, driven by a self-regulated low-voltage a.c./d.c. contact **arc discharge** and/or a resistive heating. A unique geometry of the electrode system allows a continuous prodn. of the dense deposits with a yield of 1-3 g/min and specific consumption of elec. energy of 25-50 kW-h/kg of the deposit.

IT **1333-74-0, Hydrogen,** processes
(**absorption** by carbon **nanoparticles**; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

CC 51-11 (Fossil Fuels, Derivatives, and Related Products)

ST carbon **nanotube** hydrocarbon **arc discharge** resistive heating cracking **nanoparticle**

IT Electric arc
Electric heating
Electron emission
Petroleum cracking
(carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT **Nanotubes**
(carbon, multi- and single-walled; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT Hydrocarbons, processes
(liq.; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT **Nanoparticles**
(single-walled carbon nanohorns and polyhedrals; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

IT **1333-74-0, Hydrogen**, processes
(**absorption** by carbon **nanoparticles**; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)
IT 74-86-2P, Acetylene, preparation
(carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)
IT 67-64-1, Acetone, processes 71-43-2, Benzene, processes 76-22-2, Camphor 108-88-3, Toluene, processes 110-54-3, Hexane, processes 110-82-7, Cyclohexane, processes
(starting material; carbon **nanotube** prodn. by a cracking of liq. hydrocarbons)

L69 ANSWER 7 OF 28 HCA COPYRIGHT 2004 ACS on STN
137:387054 Synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst. Kudo, Hidehiro; Unno, Ken; Kamegawa, Atsunori; Takamura, Hitoshi; Okada, Masuo (Department of Materials Science, Graduate school of Engineering, Tohoku University, Sendai, 980-8579, Japan). Materials Transactions, 43(5), 1127-1132 (English) 2002. CODEN: MTARCE. ISSN: 1345-9678. Publisher: Japan Institute of Metals.
AB Vapor grown carbon nano-fibers (VGCFs) were synthesized by using Fe ingots, Fe powders, nanocryst. Fe91Zr7B2 and Fe75Si15B10 alloy catalysts with **fine** bcc-Fe **grains** (.apprx.20 nm). The Fe particles worked as catalysts were formed by fracturing original Fe ingots, Fe powders, and nanocryst. alloys before the formation of VGCFs. TEM and HREM observations indicated that VGCFs' structures turned out to be platelet type grown from Fe powders and Fe91Zr7B2, and the tubular type grown from nanocryst. Fe75Si15B10 alloy. In addn. to these structures, VGCFs grown from Fe ingots exhibited herringbone and coil type structures. Diam. of VGCFs prepd. from nanocryst. Fe75Si15B10 alloy was smaller than that of grown from Fe91Zr7B2 alloy. This could be originated from the difference of fracturing process between nanocryst. Fe91Zr7B2 and Fe75Si15B10 alloys. Protium absorbing properties of VGCFs were evaluated by a Siverts-type app. and electrochem. method. It turned out that VGCFs had little protium absorbing capacity.
IT **1333-74-0, Hydrogen**, processes
(**storage**; synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **131735-29-0**
(synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)

RN 131735-29-0 HCA
CN Iron alloy, base, Fe 89,Zr 11,B 0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Fe	89	7439-89-6
Zr	11	7440-67-7
B	0.4	7440-42-8

IT **7440-44-0**, Carbon, processes
(synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
ST carbon nanofibers **hydrogen storage**
IT **Storage**
(of **hydrogen**; synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)
IT **1333-74-0, Hydrogen**, processes
(**storage**; synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)
IT 64068-92-4 **131735-29-0**
(synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)
IT **7440-44-0**, Carbon, processes
(synthesis and protium absorbing properties of vapor grown carbon nanofibers grown by Fe-based catalyst)

L69 ANSWER 8 OF 28 HCA COPYRIGHT 2004 ACS on STN
137:327473 Purification of carbon filaments and their use for **storing hydrogen.** Pradhan, Bhabendra K.; Harutyunyan, Avetik; Eklund, Peter C.; Fujiwara, Yoshiya; Goto, Hajime (The Penn State Research Foundation, USA; Honda Giken Kogyo Kabushiki Kaisha; Honda Motor Co., Ltd.). PCT Int. Appl. WO 2002083556 A2 20021024, 30 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG,

CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-US11617 20020412. PRIORITY: US 2001-PV283470 20010412; US 2001-PV324066 20010924.

AB A single-wall carbon **nanotube** contg. carbon soot with amorphous carbon and metals as impurities is purified to obtain single a product suitable for the **storage** of **hydrogen** at low temp. The soot prepd. by **arc-discharge** is heated in the presence of air at 220-1000.degree.C for at least 30 min to selectively oxidize carbon impurities. The soot is then refluxed in hydrochloric acid or nitric acid to remove metal impurities derived from catalysts, such as nickel or titanium. The nano-structured carbon is washed, dried, and heated at 650.degree.C under vacuum to remove functional groups on the carbon surface. The purified product can store about 6.5 wt.% of H2 at 77 K and at < 2 atm. and can be potentially used for fuel cells.

IT **7440-44-0P**, Carbon, uses
(cryst. and amorphous; purifn. of carbon filaments and their use for **storing hydrogen**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7440-32-6**, Titanium, uses
(purifn. of carbon filaments and their use for **storing hydrogen**)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IC ICM C01B031-00

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

ST single wall carbon **nanotube** purifn **hydrogen storage** fuel cell

IT **Nanotubes**
(carbon fibers; purifn. of carbon filaments and their use for **storing hydrogen**)

IT Carbon fibers, uses
(**nanotube**; purifn. of carbon filaments and their use for **storing hydrogen**)

IT Electric arc
Fuel cells

Soot
(purifn. of carbon filaments and their use for **storing hydrogen**)
IT Metals, uses
(purifn. of carbon filaments and their use for **storing hydrogen**)
IT **7440-44-0P,** Carbon, uses
(cryst. and amorphous; purifn. of carbon filaments and their use for **storing hydrogen**)
IT 7440-02-0, Nickel, uses **7440-32-6,** Titanium, uses
(purifn. of carbon filaments and their use for **storing hydrogen**)
IT 1333-74-0, Hydrogen, uses
(purifn. of carbon filaments and their use for **storing hydrogen**)
IT 7647-01-0, Hydrochloric acid, reactions 7697-37-2, Nitric acid, reactions 7722-84-1, Hydrogen peroxide, reactions
(purifn. of carbon filaments and their use for **storing hydrogen**)

L69 ANSWER 9 OF 28 HCA COPYRIGHT 2004 ACS on STN
137:297417 **Hydrogen-storage** material for use in fuel cell powered vehicles. Goto, Hajime; Furuta, Terumi; Tokune, Toshio; Fujiwara, Yoshiya (Japan). U.S. Pat. Appl. Publ. US 2002146624 A1 20021010, 15 pp. (English). CODEN: USXXCO. APPLICATION: US 2002-79816 20020222. PRIORITY: JP 2001-49327 20010223; JP 2001-342124 20011107.

AB A **hydrogen-storage** material includes a plurality of **carbon carriers** made of a carbon material having an elec. cond., and a plurality of **fine particles** carried on each of the **carbon carriers** and having a **hydrogen-adsorbing** ability. The amt. A of **fine particles** carried is in a range of 0.1% by wt..ltoreq.A.ltoreq.20% by wt. The **fine particles** are at least one selected from **fine particles** of a metal, **fine particles** of an alloy and **fine particles** of an oxide semiconductor. For example, the alloy corresponds to an alloy made of at least one selected from the group consisting of Mg, Ti, a rare earth element, Zr, V, Ca and Al, and at least one selected from the group consisting of Fe, Co, Ni, Cu, Mn, Mo and W. Thus, the **hydrogen-storage** material is relatively light; has a high **hydrogen-storing** ability at ambient temp. and under a lower hydrogen pressure; and moreover, exhibits **hydrogen-absorbing**/releasing rates.

INSTANT APPLICATION

IT **7440-44-0, Activated carbon,** uses
(**activated; hydrogen-storage**

material for use in fuel cell powered vehicles)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7439-91-0**, Lanthanum, uses **7440-03-1**, Niobium, uses **7440-25-7**, Tantalum, uses **7440-32-6**, Titanium, uses **7440-45-1**, Cerium, uses **7440-58-6**, Hafnium, uses **7440-62-2**, Vanadium, uses **7440-67-7**, Zirconium, uses
(**hydrogen-storage** material for use in fuel cell powered vehicles)
RN 7439-91-0 HCA
CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

RN 7440-03-1 HCA
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-25-7 HCA
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-45-1 HCA
CN Cerium (8CI, 9CI) (CA INDEX NAME)

Ce

RN 7440-58-6 HCA
CN Hafnium (8CI, 9CI) (CA INDEX NAME)

Hf

RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 7440-67-7 HCA
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

IC ICM H01M004-58
ICS H01M004-62
NCL 429218200
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage** material use fuel cell powered vehicle
IT Electric vehicles
Fuel cells
Hydriding
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT Alloys, uses
Carbon black, uses
Carbonaceous materials (technological products)
Fullerenes
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT Semiconductor materials
(oxide; **hydrogen-storage** material for use in fuel cell powered vehicles)
IT **7440-44-0, Activated carbon**, uses
(**activated; hydrogen-storage** material for use in fuel cell powered vehicles)
IT 1333-74-0, **Hydrogen**, uses
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT 12035-60-8P 12057-65-7P 12196-72-4P
(**hydrogen-storage** material for use in fuel cell powered vehicles)
IT 1313-99-1, Nickel oxide, uses 1314-13-2, Zinc oxide, uses 1332-29-2, Tin oxide 1332-37-2, Iron oxide, uses 1344-70-3,

Copper oxide **7439-91-0**, Lanthanum, uses **7440-03-1**
, Niobium, uses **7440-25-7**, Tantalum, uses
7440-32-6, Titanium, uses **7440-45-1**, Cerium, uses
7440-58-6, Hafnium, uses **7440-62-2**, Vanadium, uses
7440-67-7, Zirconium, uses 11099-11-9, Vanadium oxide
11104-61-3, Cobalt oxide 11118-57-3, Chromium oxide 11129-60-5,
Manganese oxide 13463-67-7, Titanium oxide, uses
(**hydrogen-storage** material for use in fuel
cell powered vehicles)

L69 ANSWER 10 OF 28 HCA COPYRIGHT 2004 ACS on STN
137:251482 Preparation of a **fine-grained** doped
graphite material and its out-gassing property. Fan,
Zhuang-jun; Zhai, Geng-tai; Chen, Jun-ling; Li, Jian-gang; Song,
Jin-ren; Liu, Lang (Institute of Coal Chemistry, Chinese Academy of
Sciences, Taiyuan, 030001, Peop. Rep. China). Xinxing Tan Cailiao,
17(2), 51-55 (Chinese) 2002. CODEN: XTCAFT. ISSN: 1007-8827.
Publisher: Kexue Chubanshe.

AB A ball-milling dispersion method has been developed for the prepn. of multi-element (Ti, Si, B)-doped **graphite** with starting mixt. powders below 100 nm. Such doped **graphite** has high thermal cond. and excellent mech. properties (116 MPa). The out-gassing behavior of doped **graphite** BM (with ball-milling) and CM (without ball-milling) showed that there was no difference before and after electron beam irradn. However, the emission of H_2, H_2O, CO, esp. CO_2 of BM was much less than that of CM. A **fine-grained** microstructure of BM was obsd. by SEM. The particle size, distribution and phase compn. were investigated with EDX, TEM and XRD. Correlations between microstructure and properties of such doped **graphite** are discussed.

IT **7782-42-5**, **Graphite**, processes
(B-Si-Ti-doped; effects of ball milling on prepn. and properties
of **fine-grained** (Si + B + Ti)-doped
graphite and effects of electron beam irradn. on
out-gassing property)

RN 7782-42-5 HCA

CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **1333-74-0**, **Hydrogen**, processes
(**adsorbed**; effects of ball milling on prepn. and
properties of **fine-grained** (Si + B +
Ti)-doped **graphite** and effects of electron beam irradn.
on out-gassing property)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **7440-32-6**, Titanium, uses
(dopant; effects of ball milling on prepn. and properties of **fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradn. on out-gassing property)
RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 57-8 (Ceramics)
ST **graphite** doping ball milling property out gassing
IT Ball milling
Bending strength
Electric resistance
Particle size
Particle size distribution
Porosity
Thermal conductivity
(effects of ball milling on prepn. and properties of **fine -grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradn. on out-gassing property)
IT Electron beams
(irradn.; effects of ball milling on prepn. and properties of **fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradn. on out-gassing property)
IT **7782-42-5**, **Graphite**, processes
(B-Si-Ti-doped; effects of ball milling on prepn. and properties of **fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradn. on out-gassing property)
IT 124-38-9, Carbon dioxide, processes 630-08-0, Carbon monoxide, processes **1333-74-0**, **Hydrogen**, processes
7732-18-5, Water, processes
(**adsorbed**; effects of ball milling on prepn. and properties of **fine-grained** (Si + B + Ti)-doped **graphite** and effects of electron beam irradn. on out-gassing property)
IT 7440-21-3, Silicon, uses **7440-32-6**, Titanium, uses
7440-42-8, Boron, uses
(dopant; effects of ball milling on prepn. and properties of

fine-grained (Si + B + Ti)-doped
graphite and effects of electron beam irradn. on
out-gassing property)
IT 409-21-2, Silicon carbide sic, formation (nonpreparative)
12045-63-5, Titanium boride tib2 12069-32-8, Boron carbide b4c
12070-08-5, Titanium carbide tic
(secondary phase; effects of ball milling on prepn. and
properties of **fine-grained** (Si + B +
Ti)-doped **graphite** and effects of electron beam irradn.
on out-gassing property)

L69 ANSWER 11 OF 28 HCA COPYRIGHT 2004 ACS on STN
136:347277 Electrochemical reduction of nickel(II) hydroxide deposited
on carbon powder and application to a new activation method for
hydrogen storage alloy negative electrodes.
Morishita, Shinya; Isogai, Yoshihiro; Itoh, Kazuhiko; Towata,
Shin-ichi; Abe, Katsushi (Toyota Central Research and Development
Laboratories, Inc., Nagakute, Aichi, 480-1192, Japan). Nippon
Kagaku Kaishi (2), 129-133 (Japanese) 2002. CODEN: NKAKB8. ISSN:
0369-4577. Publisher: Nippon Kagakkai.
AB After cathodic polarization, nickel(II) hydroxide-deposited carbon
powder [Ni(OH)2/C] was studied by XRD, magnetism measurement, and
TEM observation. More than 1.4% of the nickel(II) hydroxide
deposited on the surface of the carbon powder was electrochem.
reduced and **fine** nickel **particles** were formed.
Since the **fine** nickel **particles** act as active
sites for charge/discharge reactions, the initial activation of
hydrogen storage alloy neg. electrodes was
promoted by adding Ni(OH)2/C.
IT **7440-44-0**, Carbon, uses
(electrochem. redn. of Ni(OH)2 on carbon powder and application
to activation method for **hydrogen storage**
alloy electrodes)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **417704-53-1**, Aluminum 1.9, cerium 9.8, cobalt 9.9, lanthanum
15, manganese 3.9, neodymium 7.3, nickel 51, praseodymium 1.9
(electrochem. redn. of nickel hydroxide deposited on carbon
powder and application to activation for **hydrogen
storage** alloy neg. electrodes of)
RN 417704-53-1 HCA
CN Nickel alloy, base, Ni 51,La 15,Co 9.9,Ce 9.8,Nd 7.3,Mn 3.9,Al
1.9,Pr 1.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	51	7440-02-0
La	15	7439-91-0
Co	9.9	7440-48-4
Ce	9.8	7440-45-1
Nd	7.3	7440-00-8
Mn	3.9	7439-96-5
Al	1.9	7429-90-5
Pr	1.9	7440-10-0

CC 72-2 (Electrochemistry)
Section cross-reference(s): 52, 66, 77
ST electrochem redn nickel hydroxide deposited carbon powder; nickel hydroxide activation **hydrogen storage** alloy neg electrode; battery **hydrogen storage** electrode **activation** nickel hydroxide **carbon**
IT Battery anodes
(activation of **hydrogen storage** alloy)
IT Reduction, electrochemical
(of nickel hydroxide on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)
IT 1333-74-0, Hydrogen, uses **7440-44-0**, Carbon, uses
(electrochem. redn. of Ni(OH)2 on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)
IT **417704-53-1**, Aluminum 1.9, cerium 9.8, cobalt 9.9, lanthanum 15, manganese 3.9, neodymium 7.3, nickel 51, praseodymium 1.9
(electrochem. redn. of nickel hydroxide deposited on carbon powder and application to activation for **hydrogen storage** alloy neg. electrodes of)
IT 12054-48-7, Nickel hydroxide
(electrochem. redn. on carbon powder and application to activation method for **hydrogen storage** alloy electrodes)

L69 ANSWER 12 OF 28 HCA COPYRIGHT 2004 ACS on STN
136:156864 Vibrational Sum Frequency Spectroscopy on Pd(111) and Supported Pd **Nanoparticles**: CO Adsorption from Ultrahigh Vacuum to Atmospheric Pressure. Unterhalt, Holger; Rupprechter, Guenther; Freund, Hans-Joachim (Chemical Physics Department, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, D-14195, Germany). Journal of Physical Chemistry B, 106(2), 356-367 (English) 2002. CODEN: JPCBFK. ISSN: 1089-5647. Publisher: American Chemical Society.
AB The adsorption of CO on Pd(111) and on Al2O3-supported Pd

nanoparticles was studied by picosecond IR-visible sum frequency generation (SFG) vibrational spectroscopy in a pressure range from 10-7 to 1000 mbar and at 100-520 K. Under ultrahigh vacuum (UHV), the samples were further characterized by LEED, Auger electron spectroscopy (AES), and temp.-programmed desorption (TPD). Identical high coverage (satn.) CO structures were obsd. on Pd(111) under UHV conditions (10-7 mbar, 100 K) and at high pressure (e.g., 1 mbar, 190 K). No indications of pressure-induced surface rearrangements of Pd(111) were evident from SFG and LEED. SFG spectra of CO adsorption on defect-rich Pd(111) revealed an addnl. peak that was attributed to adsorption on defect (step or edge) sites. The CO adsorbate structure on supported Pd **nanoparticles** is different from that on Pd(111) and to be more similar to that on stepped or strongly **sputtered** Pd(111). At low pressure, the adsorption site occupancy depended on the particle surface structure and temp. CO preferentially adsorbed in bridge sites on well-faceted Pd particles, while on more defective Pd particles, on-top sites were occupied as well. However, at 200 mbar CO, an adsorption site occupancy was obtained that was nearly independent of the particle surface structure. While the surface structure of the Pd particles remained unchanged upon high-pressure gas exposure, an annealing treatment to 300-400 K was able to order the Pd particle surface. Gas mixts. of CO and hydrogen on Pd(111) showed SFG spectra similar to the pure CO case indicating the absence of a strong interaction between CO and hydrogen.

CC 66-3 (Surface Chemistry and Colloids)
Section cross-reference(s): 73

ST vibrational sum frequency spectroscopy palladium surface carbon monoxide adsorption; alumina **supported** palladium **nanoparticle carbon** monoxide adsorption

IT **Adsorption**
(coadsorption; **hydrogen** and CO coadsorption on Pd(111) and on alumina-supported Pd **nanoparticles** using vibrational sum frequency spectroscopy)

IT Vibrational spectra
(sum frequency generation; of CO adsorbed on Pd(111) and on alumina-supported Pd **nanoparticles**)

IT Sum-frequency generation
(vibrational spectra; of CO adsorbed on Pd(111) and on alumina-supported Pd **nanoparticles**)

IT 630-08-0, Carbon monoxide, properties 7440-05-3, Palladium, properties
(CO adsorption on Pd(111) and on alumina-supported Pd **nanoparticles** using vibrational sum frequency spectroscopy)

IT 1333-74-0, Hydrogen, properties
(hydrogen and CO coadsorption on Pd(111) and on alumina-supported

Pd **nanoparticles** using vibrational sum frequency spectroscopy)

L69 ANSWER 13 OF 28 HCA COPYRIGHT 2004 ACS on STN
136:104317 Heat pump apparatus. Osumi, Yasuaki; Tsuboi, Toshiyuki; Kataoka, Fumiaki (Futaba Denshi Kogyo Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002005539 A2 20020109, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-188019 20000622.

AB The title app. includes a 1st container having **C-based H-absorbing** material accommodated therein, a 2nd container having **H-absorbing** alloy accommodated therein, and both containers are connected via a pipe and a valve; while H is released from the **C-based H-absorbing** material or the **H-absorbing** alloy, it is absorbed by the other side, and the **H-absorbing** alloy generates or absorbs heat. The **H-absorbing** alloy is a multicomponent alloy of the La-Ni, misch metal-Ni, Ti-Fe, Ti-Mn, Ti-Cr, Zr-Fe, V-based or Mg-Ni type. The **C-based H-absorbing** material can be **graphite** intercalation compd., **activated C, C nanotubes**, C nanofibers, C nanohorns or **nanoparticles**, etc.

IT **1333-74-0, Hydrogen**, processes
(**absorption** and desorption of; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **7440-44-0**, Carbon, uses **11123-80-1 12618-08-5 12783-48-1 54741-72-9**
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

RN 11123-80-1 HCA
CN Titanium alloy, base, Ti,Fe (9CI) (CA INDEX NAME)

Component	Component Registry Number
Ti	7440-32-6
Fe	7439-89-6

RN 12618-08-5 HCA
CN Titanium alloy, base, Ti,Mn (9CI) (CA INDEX NAME)

Component	Component Registry Number
Ti	7440-32-6
Mn	7439-96-5

RN 12783-48-1 HCA
CN Zirconium alloy, base, Zr,Fe (9CI) (CA INDEX NAME)

Component	Component Registry Number
Zr	7440-67-7
Fe	7439-89-6

RN 54741-72-9 HCA
CN Lanthanum alloy, base, La,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
La	7439-91-0
Ni	7440-02-0

IT **7782-42-5, Graphite**, uses **11147-24-3**
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

RN 11147-24-3 HCA
CN Magnesium alloy, base, Mg,Ni (9CI) (CA INDEX NAME)

Component	Component Registry Number
Mg	7439-95-4
Ni	7440-02-0

IC ICM F25B017-12
ICS C22C014-00; C22C019-00; C22C038-00; C22C038-14
CC 47-4 (Apparatus and Plant Equipment)
Section cross-reference(s): 49, 56
ST heat pump app **hydrogen absorption** desorption; **carbon based hydrogen absorbing** material heat pump; **hydrogen absorbing** alloy heat pump
IT **Nanoparticles**
(carbon; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT **Nanotubes**
(carbon; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT Heat pumps
(heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT Alloys, uses
Intercalation compounds
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT Carbon fibers, uses
(nanofibers; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT Vanadium alloy, base
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)
IT **1333-74-0, Hydrogen**, processes
(**absorption** and desorption of; heating pump app. with **carbon-based hydrogen-**

absorbing material and **hydrogen-**
absorbing alloy in different containers)

IT 7440-44-0, Carbon, uses **11123-80-1**
12618-08-5 12621-17-9 **12783-48-1**
54741-72-9 62699-13-2
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

IT 7782-42-5, **Graphite**, uses **11147-24-3**
(**hydrogen-absorbing**; heating pump app. with **carbon-based hydrogen-absorbing** material and **hydrogen-absorbing** alloy in different containers)

L69 ANSWER 14 OF 28 HCA

134:225068 **Hydrogen absorbing carbonaceous** materials and their manufacture, and batteries and fuel cells. Shiraishi, Masashi; Negishi, Eisuke; Hinokuma, Koichiro; Yamada, Atsuo; Kajiura, Hisashi; Tanaka, Koichi; Ata, Masafumi (Sony Corp., Japan). PCT Int. Appl. WO 2001017900 A1 20010315, 232 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (Japanese). CODEN: PIXXD2. APPLICATION: WO 2000-JP6199 20000911. PRIORITY: JP 1999-255743 19990909; JP 1999-285639 19991006; JP 1999-300381 19991022; JP 1999-303968 19991026; JP 1999-322975 19991112; JP 1999-330948 19991122; JP 1999-351701 19991210; JP 2000-127113 20000427.

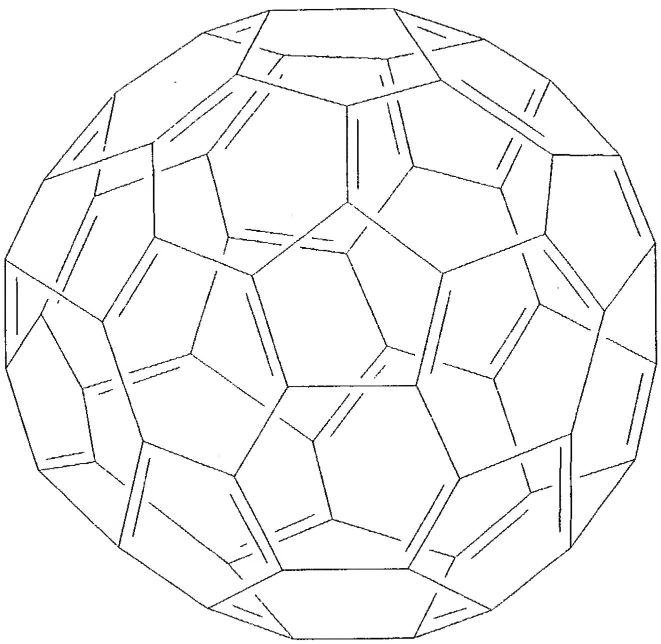
AB The **carbonaceous** materials **absorbs H** as protons. Preferably, the **carbonaceous** materials have work function .gtoreq.4.9 eV and are C **nanotubes**, **fullerenes**, or **fullerene** mixts. contg. metals or electrode donors, e.g., F or amines. The **carbonaceous** materials are prepd. by **arc discharge**, CVD, laser abrasion, or high temp. treatment of SiC. The batteries use electrodes contg. the **carbonaceous** material. The fuel cells use the **H absorbing carbonaceous** materials as H source for anodes.

IT **99685-96-8DP**, C60 **Fullerene**, fluorinated
99685-96-8P, C60 **Fullerene 115383-22-7P**,
C70 **Fullerene**
(structure and manuf. of **hydrogen absorbing**

carbonaceous materials for battery and fuel cell electrodes)

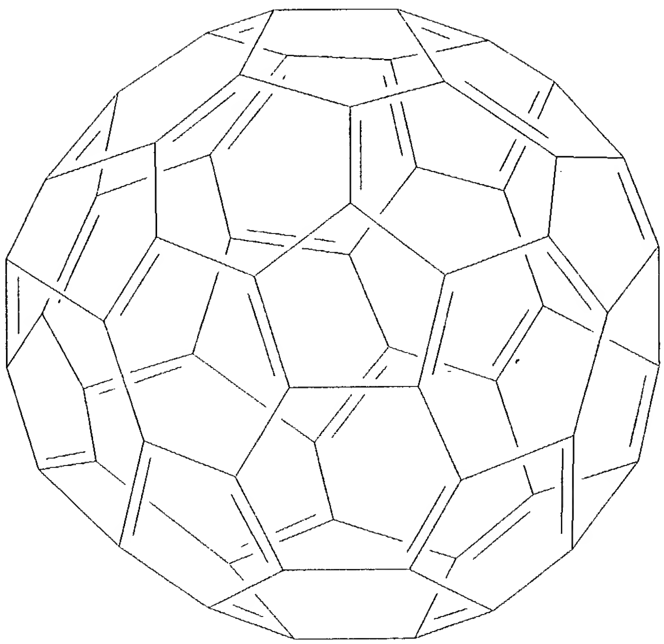
RN 99685-96-8 HCA

CN [5,6]Fullerene-C60-Ih (9CI) (CA INDEX NAME)



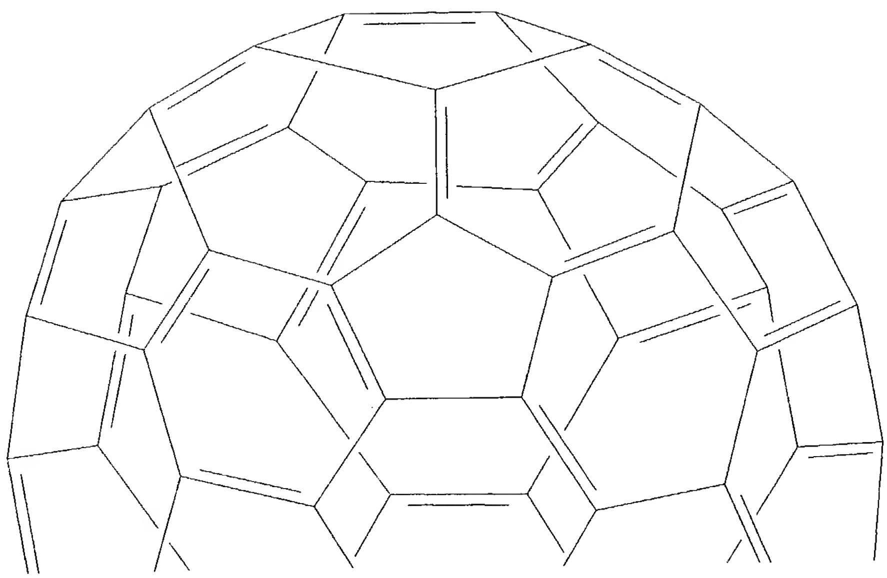
RN 99685-96-8 HCA

CN [5,6]Fullerene-C60-Ih (9CI) (CA INDEX NAME)

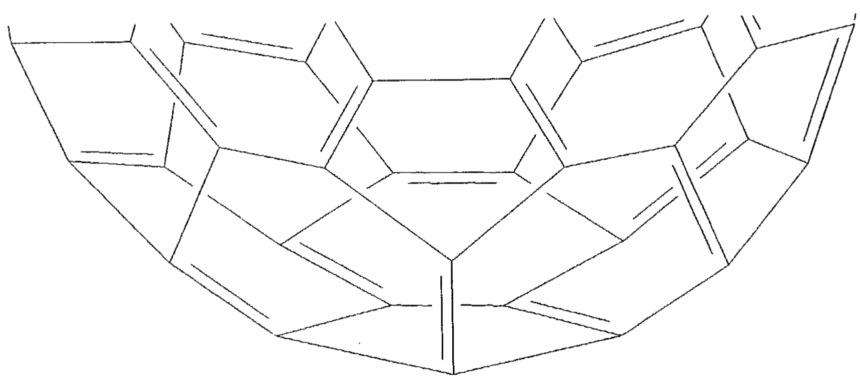


RN 115383-22-7 HCA
CN [5,6]Fullerene-C70-D5h(6) (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



IT **7440-32-6P**, Titanium, uses **7440-62-2P**, Vanadium, uses
(structure and manuf. of metal contg. **hydrogen**

absorbing carbonaceous materials for battery
and fuel cell electrodes)

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

IC ICM C01B031-02
ICS C01B031-04; C01B003-00; H01M004-24; H01M004-38; H01M010-24;
H01M012-08; H01M008-04; B01J020-20
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **hydrogen absorbing carbonaceous**
material structure manuf; battery electrode **hydrogen**
absorbing carbonaceous material; fuel cell anode
hydrogen absorbing carbonaceous
material; carbon **nanotube hydrogen**
absorbing electrode; **fullerene hydrogen**
absorbing electrode
IT **Nanotubes**
(**carbonaceous**; structure and manuf. of **hydrogen**
absorbing carbonaceous materials for battery
and fuel cell electrodes)
IT Vapor deposition process
(chem.; manuf. of **hydrogen absorbing**
carbonaceous materials by **arc discharge**
for battery and fuel cell electrodes)
IT Work function
(**hydrogen absorbing carbonaceous**
materials with controlled work function for battery and fuel cell
electrodes)
IT Abrasion
(laser; manuf. of **hydrogen absorbing**
carbonaceous materials by laser abrasion for battery and
fuel cell electrodes)
IT Electric arc
(manuf. of **hydrogen absorbing**
carbonaceous materials by **arc discharge**
for battery and fuel cell electrodes)
IT Lasers
(manuf. of **hydrogen absorbing**
carbonaceous materials by laser abrasion for battery and

fuel cell electrodes)
IT **Carbonaceous** materials (technological products)
(structure and manuf. of **hydrogen absorbing** **carbonaceous** materials for battery and fuel cell electrodes)
IT Fuel cell anodes
(structure and manuf. of **hydrogen absorbing** **carbonaceous** materials for hydrogen source for fuel cell anodes)
IT Battery anodes
(structure and manuf. of **hydrogen absorbing** **carbonaceous** materials for secondary battery anodes)
IT Battery electrodes
Primary batteries
(structure and manuf. of **hydrogen absorbing** metal contg. **carbonaceous** materials for air battery electrodes)
IT 409-21-2, Silicon carbide (SiC), processes
(manuf. of **hydrogen absorbing** **carbonaceous** materials by heat treatment of silicon carbide for battery and fuel cell electrodes)
IT **99685-96-8DP**, C60 **Fullerene,** fluorinated
99685-96-8P, C60 **Fullerene 115383-22-7P**,
C70 **Fullerene**
(structure and manuf. of **hydrogen absorbing** **carbonaceous** materials for battery and fuel cell electrodes)
IT 1333-74-0, Hydrogen, miscellaneous
(structure and manuf. of **hydrogen absorbing** **carbonaceous** materials for battery and fuel cell electrodes)
IT 7439-89-6P, Iron, uses 7440-06-4P, Platinum, uses 7440-20-2P, Scandium, uses **7440-32-6P**, Titanium, uses 7440-48-4P, Cobalt, uses 7440-54-2P, Gadolinium, uses **7440-62-2P**, Vanadium, uses
(structure and manuf. of metal contg. **hydrogen absorbing carbonaceous** materials for battery and fuel cell electrodes)

L69 ANSWER 15 OF 28 HCA
133:352572 Analysis of the activation mechanism of **hydrogen storage** alloy negative electrodes containing palladium ion-adsorbed carbon powder. Morishita, Shinya; Fujita, Katsuyoshi; Ito, Kazuhiko; Towata, Shinichi; Abe, Katsushi (Toyota Central Research and Development Laboratories, Inc., Yokomichi, Nagakute, Aichi, 480-1192, Japan). Nippon Kagaku Kaishi (11), 773-778 (Japanese) 2000. CODEN: NKAKB8. ISSN: 0369-4577. Publisher: Nippon Kagakkai.

AB In the case of Ni-MH batteries, the initial activation of the **hydrogen storage** alloy neg. electrodes was promoted by adding palladium ion-adsorbed carbon powder (Pd2+/C). From electrochem. impedance anal. of the neg. electrodes, and TEM observation and XRD measurement of Pd2+/C after cathodic polarization, the mechanism of this phenomenon was presumed to be as follows: (1) palladium ion is reduced to **fine** palladium **particles** during the first charge, (2) the **fine** palladium **particles** act as active sites for charge/discharge reactions, and (3) pulverization of the alloy particles occurs due to vol. expansion by the **hydrogen absorption** into the alloy, and new active sites are formed on the fresh alloy surface. Therefore, the promotion of the initial activation of the neg. electrode is obsd. by addn. of Pd2-/C.

IT **304865-88-1**
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

RN 304865-88-1 HCA

CN Nickel alloy, base, Ni 53,La 15,Co 9.7,Ce 9.6,Pr 7,Mn 2.6,Al 1.9,Nd 1.7 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	53	7440-02-0
La	15	7439-91-0
Co	9.7	7440-48-4
Ce	9.6	7440-45-1
Pr	7	7440-10-0
Mn	2.6	7439-96-5
Al	1.9	7429-90-5
Nd	1.7	7440-00-8

IT **7440-44-0**, Carbon, uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST battery anode palladium **adsorbed** carbon **hydrogen storage** alloy

IT Battery anodes
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
IT **304865-88-1**
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
IT **7440-44-0**, Carbon, uses 16065-88-6, Palladium(2+), uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)
IT 1333-74-0, Hydrogen, uses
(anal. of activation mechanism of **hydrogen storage** alloy anodes contg. palladium ion-adsorbed carbon powder)

L69 ANSWER 16 OF 28 HCA COPYRIGHT 2004 ACS on STN
133:94917 Nano-diamond films deposited by direct current **glow discharge** assisted chemical vapor deposition. Heiman, A.; Gouzman, I.; Christiansen, S. H.; Strunk, H. P.; Hoffman, A. (Solid State Institute and Wolfson Center for Interfaces, Chemistry Department, Technion-Israel Institute of Technology, Haifa, 32000, Israel). Diamond and Related Materials, 9(3-6), 866-871 (English) 2000. CODEN: DRMTE3. ISSN: 0925-9635. Publisher: Elsevier Science S.A..
AB Continuous carbon films are deposited by the d.c. (DC) **glow discharge** assisted chem. vapor deposition method using a hydrogen-methane gas mixt. As a result of the DC-**glow discharge**-surface interaction, the substrate is covered by a film whose properties are strongly affected by the **glow discharge** and substrate conditions. It was found that under appropriate combination of the exptl. parameters, a nano-sized carbon composite film contg. a predominating diamond phase can be produced. The properties of the deposited carbon films were studied as a function of exptl. conditions by a no. of complementary techniques. The compn. of the films was assessed by electron spectroscopy and the elastic recoil detection method; the morphol. and structure of the films were investigated by high-resoln. scanning and transmission electron microscopy (HR TEM and HR SEM). Particular attention was paid to the studies of chem. bonding of the deposited materials. For this purpose, the near-edge X-ray absorption fine structure (NEXAFS) and XPS and electron energy loss spectroscopy (EELS) techniques were used. The av. film d. was measured by Rutherford backscattering spectrometry.Electron diffraction, NEXAFS and EELS measurements render unambiguous evidence of diamond phase formation by the DC-**glow discharge** process. The nano-size dimensions of the

deposited material were detd. from both HR-SEM and -TEM measurements. The crit. role of substrate temp. for the formation of **nano**-diamond **particles** was established based on the spectroscopic and microscopic results. **Hydrogen adsorption**/desorption appears to be a crit. factor in this process.

IT **7440-44-0P**, Carbon, properties
(nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 66-3 (Surface Chemistry and Colloids)
Section cross-reference(s): 75

IT Hydrogenation
Nanostructures
Phase composition
Surface structure
(nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT **Adsorption**
(of **hydrogen**; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT Vapor deposition process
(plasma; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT **7440-44-0P**, Carbon, properties
(nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 1333-74-0, Hydrogen, processes
(nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 74-82-8, Methane, reactions
(nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

IT 7440-21-3, Silicon, processes
(substrates; nanostructure diamond films deposited by d.c. **glow discharge** assisted chem. vapor deposition)

L69 ANSWER 17 OF 28 HCA COPYRIGHT 2004 ACS on STN

132:314898 Electrochemical investigation on hydride electrode with tungsten carbide additive. Yang, Xiao-Guang; Zhang, Xiao-Bin; Tan, Guo-Long; Zhang, Wen-Kui; Lei, Yong-Quan; Wang, Qi-Dong; Wu, Xi-Jun (Department of Materials Science and Engineering, Zhejiang

University, Hangzhou, 310027, Peop. Rep. China). Transactions of Nonferrous Metals Society of China, 10(1), 60-63 (English) 2000. CODEN: TNMCEW. ISSN: 1003-6326. Publisher: Transactions of Nonferrous Metals Society of China.

AB Nano-meter-sized WC powder (1.apprx.20 nm) was synthesized by mechanochem. explosion synthesis. The catalytic property of WC powder was discovered to decomp. the mol. water and chem.-**adsorb H** atoms in KOH soln., and accelerate the combination reaction of hydrogen during the cathodic polarization, thus a neg. effect on the activation was found because of easy H2 emission. Electrochem. impedance spectroscopy (EIS) showed that the **adsorbed hydrogen** atoms on the surface of WC are first electrochem. oxidized due to their lower chem. bonding, and that the low cond. of WC powder also increases the internal resistance of electrodes.

IT **1333-74-0, Hydrogen**, properties
(**adsorption** on Zr0.5Ti0.5(Mn0.25V0.15Ni0.55)2 electrode doped with WC additive in KOH soln.)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **247066-89-3**
(electrochem. investigation on hydride electrode with tungsten carbide additive)

RN 247066-89-3 HCA

CN Nickel alloy, base, Ni 37,Zr 26,Mn 16,Ti 14,V 8.6 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	37	7440-02-0
Zr	26	7440-67-7
Mn	16	7439-96-5
Ti	14	7440-32-6
V	8.6	7440-62-2

IT **7440-44-0**, Carbon, properties
(explosion synthesis od WC from mixt. contg.)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 72-2 (Electrochemistry)
Section cross-reference(s): 52, 56
ST tungsten carbide electrode performance **hydrogen storage** alloys
IT Electrodes
Nanoparticles
(electrochem. investigation on hydride electrode with tungsten carbide additive)
IT **Adsorption**
(of **hydrogen** on Zr0.5Ti0.5(Mn0.25V0.15Ni0.55)2 electrode doped with WC additive in KOH soln.)
IT **1333-74-0, Hydrogen,** properties
(**adsorption** on Zr0.5Ti0.5(Mn0.25V0.15Ni0.55)2 electrode doped with WC additive in KOH soln.)
IT **247066-89-3**
(electrochem. investigation on hydride electrode with tungsten carbide additive)
IT 1314-35-8, Tungsten trioxide, properties 7439-95-4, Magnesium, properties **7440-44-0,** Carbon, properties
(explosion synthesis od WC from mixt. contg.)

L69 ANSWER 18 OF 28 HCA COPYRIGHT 2004 ACS on STN
130:55681 **Hydrogen-absorbing** alloys with long cycle life and their manufacture. Tsukahara, Makoto; Isomura, Akihito; Takahashi, Kunio (Aisin Seiki Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10317075 A2 19981202 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-124039 19970514.
AB The title **H-absorbing** alloys are manufd. by cooling raw material molten metals contg. V, Ti, and Ni for pptn. of TiNi-base alloy phase and/or Laves phase in grain boundaries of matrix phase comprising V-based solid soln. The above raw materials contain **fine powders**, having higher m.p. than that of **H-absorbing** alloys, which become cores in solidification of the matrix phase. The **H-absorbing** alloys have long service life.
IT **159025-74-8 217491-81-1**
(**H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)
RN 159025-74-8 HCA
CN Vanadium alloy, base, V 55,Ti 17,Hf 15,Ni 12 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
V	55	7440-62-2
Ti	17	7440-32-6
Hf	15	7440-58-6

Ni	12	7440-02-0

RN 217491-81-1 HCA
CN Vanadium alloy, base, V 61,Ti 19,Ni 13,Ta 3.4,Nb 1.8,Co 1.2 (9CI)
(CA INDEX NAME)

Component	Component Percent	Component Registry Number
V	61	7440-62-2
Ti	19	7440-32-6
Ni	13	7440-02-0
Ta	3.4	7440-25-7
Nb	1.8	7440-03-1
Co	1.2	7440-48-4

IT **7440-44-0**, Carbon, processes
(powders; **H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM C22C001-00
ICS C22C014-00; C22C019-00; H01M004-24
CC 56-3 (Nonferrous Metals and Alloys)
Section cross-reference(s): 52
ST **hydrogen absorbing** alloy vanadium titanium nickel; solidifying core metal **hydrogen absorbing** alloy; battery anode **hydrogen absorbing** alloy
IT Battery anodes
(**H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)
IT Laves phases
(**H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)
IT **159025-74-8 217491-81-1**
(**H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)
IT 1333-74-0, **Hydrogen**, uses
(alloys **absorbing**; **H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves

phases manufd. by pptn. with cores)

IT **7440-44-0**, Carbon, processes 7631-86-9, Silica, processes 12069-94-2, Niobium carbide (NbC) 12070-08-5, Titanium carbide (TiC) 12070-10-9, Vanadium carbide (VC) 12070-12-1, Tungsten carbide (WC) 25583-20-4, Titanium nitride (TiN)
(powders; **H-absorbing** alloys contg. V-base matrixes and TiNi-base alloy and/or Laves phases manufd. by pptn. with cores)

L69 ANSWER 19 OF 28 HCA COPYRIGHT 2004 ACS on STN

129:318631 On the development of new **hydrogen storage** materials FeTi(Zr), Mg-xwt.% CFMmNi5 and Mg2Ni (**nanoparticle**) for improved hydrogenation characteristics. Singh, B. K.; Raman, S. S. Sai; Singh, Arvind Kumar; Bansal, B. B.; Srivastava, O. N. (Department of Physics, Banaras Hindu University, Varanasi, 221005, India). Hydrogen Power: Theoretical and Engineering Solutions, Proceedings of the HYPOTHESIS Symposium, 2nd, Grimstad, Norway, Aug. 18-22, 1997, Meeting Date 1997, 275-289. Editor(s): Saetre, T. O. Kluwer: Dordrecht, Neth. (English) 1998. CODEN: 66STAR.

AB FeTi is one of well known state of the art **hydrogen storage** material. However its activation is rather difficult and research needs to be done to make the activation amenable. We have therefore undertaken a systematic study to find out the most appropriate elemental substitution which can turn the material readily activated. The basic idea behind them is to provide catalytic decompn. of hydrogen and reduce the activation temp. of FeTi. The Fe1-xZrxTi1+y (x=0.2, y=0.3) alloy has been successfully synthesized using R.F. induction furnace (12 KW) under argon atm. in a previously outgassed **graphite** crucible. The structural characterization (XRD) revealed that the as synthesized sample is multiphasic in nature and it exhibit the phases FeTi, Fe2Ti, FeTi2 and Ti resp. P-C. isotherms were exptl. detd. and showed the storage capacity .apprx.1.20 wt% at 200.degree.. The activation as well as desorption kinetics of FeTi is found to be significantly improved by addn. of Zr corresponding to Fe0.8Zr0.2 Ti1.3. In search of new high **hydrogen storage** (>1.5 wt%) capacities, alloys with general formula Mg-x wt% CFMmNi5(Ce-free MmNi5; x=20, 30, 40 and 50) have been successfully synthesized. The as-synthesized composite materials have been activated at 550.degree..+-.10.degree. under a hydrogen pressure of .apprx.34 kg cm-2 and their **hydrogen storage** capacities and desorption kinetics have been evaluated. The new composite **hydrogen storage** materials, in contrast to the native ingredient CFMmNi5 have been found to possess much higher storage capacity (e.g. .apprx.5.6. wt% for Mg-30wt% CFMmNi5 as compared to .apprx.1.4wt% for CFMmNi5 alone) and to exhibit favorable absorption-desorption kinetics, typified to be about .apprx.140 cm3 min-1. The structural, micro-structural

characteristics have been explored using XRD, TEM, SEM and EDAX techniques. The synthesis of the **hydrogen-storage** alloy Mg2Ni has been carried out through a single-step mech. alloying and energy ball mill. The synthesized ball-milled Mg2Ni alloy has been found to exist in the form of **fine** (**nano) particles** with sizes to about 40 .ANG.. The **nanoparticle** form has been found to lead to easy activation for hydrogenation by annealing at 300.degree. (about 10-4 torr vacuum) for 30 min. and hydrogen uptake has been found to commence from the first cycle itself.

IT **214681-58-0**
(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi5 and Mg2Ni **nanoparticle** for improved hydrogenation characteristics)

RN 214681-58-0 HCA

CN Titanium alloy, base, Ti 50,Fe 36,Zr 15 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	50	7440-32-6
Fe	36	7439-89-6
Zr	15	7440-67-7

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST **hydrogen storage** iron titanium zirconium alloy; misch metal nickel alloy **hydrogen storage**; magnesium misch metal nickel **hydrogen storage**

IT Absorption
Absorption kinetics
Composites
Nanoparticles
(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi5 and Mg2Ni **nanoparticle** for improved hydrogenation characteristics)

IT 7440-02-0, Nickel, uses 12057-65-7 54426-34-5
214681-58-0
(development of new **hydrogen storage** materials FeTi(Zr), Mg-Ce-free MmNi5 and Mg2Ni **nanoparticle** for improved hydrogenation characteristics)

IT 1333-74-0, Hydrogen, uses
(development of new **hydrogen storage** materials FeTi(Zr), Mg/Ce-free MmNi5 and Mg2Ni **nanoparticle** for improved hydrogenation characteristics)

L69 ANSWER 20 OF 28 HCA COPYRIGHT 2004 ACS on STN

128:300029 Contamination resistance of the Pd coated Ti thin films in

hydrogen absorption. Zhang, Qiangji; Fu, Xiyong; Qi, Qihong; Zhao, Pengji; Zhai, Guoliang; Mou, Fangming (Vacuum Physics Laboratory, Fudan University, Shanghai, 200433, Peop. Rep. China). Zhenkong Kexue Yu Jishu, 17(6), 394-399 (Chinese) 1997. CODEN: CKKSDV. ISSN: 0253-9748. Publisher: Zhenkong Kexue Yu Jishu Zazhishe.

AB Pd was coated on a Ti films by vapor deposition or **sputtering** at a thickness .apprx.10 nm, the **H absorptivity** and the resistance to C and O contamination of the coated Ti films were studied by XPS and AES. The **H absorptivity** of the Ti thin films is related to the electron d. of occupied states (DOS) near Fermi level (detd. by XPS). The DOS of samples with high **H absorption** capability showed a peak near Fermi level, but only a slight change was found for contaminated samples. Probably the effective surface dissocn. sites originated from Pd atoms enhance the surface absorption capability and the resistance to contamination in **hydrogen absorption.**

IT **7440-44-0**, Carbon, reactions
(contamination resistance of the Pd coated Ti thin films in **hydrogen absorption**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7440-32-6**, Titanium, properties
(contamination resistance of the Pd coated Ti thin films in **hydrogen absorption**)

RN 7440-32-6 HCA

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 66-1 (Surface Chemistry and Colloids)

ST surface contamination **hydrogen adsorption** palladium titanium

IT Adsorption
Auger electron spectroscopy
Density of states
Environmental pollution
Fermi level
Sputtering
Surface state
X-ray photoelectron spectroscopy
(contamination resistance of the Pd coated Ti thin films in

hydrogen absorption)
IT 7440-44-0, Carbon, reactions 7782-44-7, Oxygen, reactions
(contamination resistance of the Pd coated Ti thin films in
hydrogen absorption)
IT 1333-74-0, Hydrogen, properties 7440-05-3, Palladium, properties
7440-32-6, Titanium, properties
(contamination resistance of the Pd coated Ti thin films in
hydrogen absorption)

L69 ANSWER 21 OF 28 HCA COPYRIGHT 2004 ACS on STN
128:246246 Anode catalyst with high activity and long life for fuel
cell, its manufacture, anode, and fuel cell. Suzuki, Nobukazu
(Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 10074523 A2
19980317 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1996-229531 19960830.
AB The anode catalyst is Pt or Pt alloy **microparticles**
supported by elec. conductive C powders and **H-**
absorbing alloy is applied on or near the Pt
microparticles. The **H-absorbing** alloy
may consist of the 1st transition metal: La, Ti, Zr, and/or V and
the 2nd transition metal: Ni, Co, Fe, Mn, and/or Cr. The manuf. of
the anode catalyst involves (1) heating the C powders at high temp.,
(2) carrying the Pt **microparticles** on the C powders and
(3) applying the **H-absorbing** alloy. The anode
consists of a substrate and a catalyst layer contg. the catalyst.
Phosphoric acid fuel cell and solid polymer fuel cell having the
anode are also claimed.
IT **7440-62-2**, Vanadium, uses **70521-60-7**
76446-44-1 85367-91-5 204925-50-8
(**hydrogen-absorbing**; fuel cell anode catalyst
contg. **hydrogen-absorbing** alloy for high
activity and long life)
RN 7440-62-2 HCA
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 70521-60-7 HCA
CN Titanium alloy, base, Ti 45,Co 28,Fe 27 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	45	7440-32-6
Co	28	7440-48-4
Fe	27	7439-89-6

RN 76446-44-1 HCA
CN Titanium alloy, base, Ti 46,Co 28,Mn 26 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	46	7440-32-6
Co	28	7440-48-4
Mn	26	7439-96-5

RN 85367-91-5 HCA
CN Titanium alloy, base, Ti 46,Fe 43,Ni 8.5,V 2.5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	46	7440-32-6
Fe	43	7439-89-6
Ni	8.5	7440-02-0
V	2.5	7440-62-2

RN 204925-50-8 HCA
CN Platinum alloy, base, Pt 89,Co 5.8,Ti 4.7 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Pt	89	7440-06-4
Co	5.8	7440-48-4
Ti	4.7	7440-32-6

IT **7440-44-0**, Carbon, uses
(powders, catalyst support; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M004-92
ICS H01M004-88
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 67
ST fuel cell anode **hydrogen absorbing** alloy;
platinum fuel cell anode catalyst

IT **Carbon black**, uses
(catalyst support; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT Catalysts
Fuel cell anodes
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT Platinum alloy
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT 1333-74-0, Hydrogen, processes
(alloy contg., absorbed; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT 7440-06-4, Platinum, uses 12714-36-2
(fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT 7440-05-3, Palladium, uses **7440-62-2**, Vanadium, uses 12057-97-5 12196-72-4 12297-66-4 **70521-60-7** **76446-44-1** **85367-91-5** **204925-50-8** 204925-51-9
(**hydrogen-absorbing**; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)
IT **7440-44-0**, Carbon, uses
(powders, catalyst support; fuel cell anode catalyst contg. **hydrogen-absorbing** alloy for high activity and long life)

L69 ANSWER 22 OF 28 HCA COPYRIGHT 2004 ACS on STN
126:334617 Electronic states of nanocrystalline carbon. Lopinski, G.P.; Merkulov, V.I.; Lannin, J.S. (Dept. of Physics, Penn State University, University Park, PA, 16802, USA). Materials Research Society Symposium Proceedings, 452(Advances in Microcrystalline and Nanocrystalline Semiconductors--1996), 215-224 (English) 1997. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.
AB Electron energy loss spectroscopy (EELS) has been used to investigate the electronic states of isolated, nanocryst. carbon particles. Small carbon nanocrystals were prepd. via **sputter** deposition onto SiO2 substrates, followed by annealing to 700C. The structure and size distribution of the particles have been characterized by Raman scattering, Auger electron spectroscopy and electron microscopy. EELS observations indicate that a semimetal to semiconductor transition occurs for **particles smaller** than 1nm. In addn., **hydrogen adsorption** is found to significantly

affect the electronic states of these particles, indicating that both finite size and dangling bond effects modify the properties of small carbon nanocrystallites.

IT **1333-74-0, Hydrogen,** properties
(**adsorption** and effect on electronic states of nanocryst. carbon)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IT **7440-44-0D,** Carbon, nanocryst., properties
(electronic states)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 65-3 (General Physical Chemistry)
Section cross-reference(s): 66

ST electronic state nanocryst carbon EELS; silica **substrate carbon** nanocrystal **hydrogen adsorption;** semimetal semiconductor transition nanocryst carbon

IT **1333-74-0, Hydrogen,** properties
(**adsorption** and effect on electronic states of nanocryst. carbon)

IT **7440-44-0D,** Carbon, nanocryst., properties
(electronic states)

L69 ANSWER 23 OF 28 HCA COPYRIGHT 2004 ACS on STN

121:13937 Alkaline **storage** battery and **hydrogen storage** alloy particles manufacture for anodes. Fujiwara, Shozo; Izumi, Yoichi; Moriwaki, Yoshio; Matsumoto, Isao (Matsushita Electric Industrial Co., Ltd., Japan). Eur. Pat. Appl. EP 591606 A1 19940413, 33 pp. DESIGNATED STATES: R: DE, FR, GB, NL. (English). CODEN: EPXXDW. APPLICATION: EP 1993-104236 19930316. PRIORITY: JP 1992-297667 19921009.

AB The alk. secondary battery with metal oxide cathode contains particles of a **hydrogen storage** alloy used as the anode comprising base particles consisting of **hydrogen storage** alloy particles 10-50 .mu.m and **fine particles** consisting of .gtoreq.1 metal, alloy, hydrophobic resin, catalyst, metal oxide, having a **particle** size **smaller** than that of the base **particles** where the **fine particles** are very firmly bonded to the surfaces of the base **particles** (wt. ratio **fine**

/base **particles** 10-1-10-4, size ratio **fine**/base **particles** 10-1-10-3). Bonding of the **fine** **particles** to the base particles is performed by a surface treatment called mechanofusion (a mechanochem. reaction process) where the base **particles** and the **fine** **particles** are subjected to a mech. energy, esp. compression and attrition, simultaneously to emboss the surfaces of the base particles and to allow the **fine particles** to be extended and bonded firmly under pressure onto the surfaces of the base particles, thereby coating at least a part of the surfaces of the base **particles** with the **fine** **particles**.

IT **139634-80-3 155730-93-1**
(**hydrogen-absorbing**, anode contg., particulate and coated, in alk. secondary batteries)

RN 139634-80-3 HCA

CN Zirconium alloy, base, Zr 45,Ni 37,Mn 8.1,Cr 5.1,V 5 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Zr	45	7440-67-7
Ni	37	7440-02-0
Mn	8.1	7439-96-5
Cr	5.1	7440-47-3
V	5	7440-62-2

RN 155730-93-1 HCA

CN Nickel alloy, base, Ni 54,misch metal 33,Co 7,Mn 3.9,Al 1.9 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ni	54	7440-02-0
Misch metal	33	8049-20-5
Co	7	7440-48-4
Mn	3.9	7439-96-5
Al	1.9	7429-90-5

IT **7440-03-1**, Niobium, uses **7440-32-6**, Titanium, uses **7440-44-0**, **Carbon**, uses
(particles, **base hydrogen storage** alloy particles coated with, for battery anode)

RN 7440-03-1 HCA

CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M006-00
ICS H01M004-38
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST alk secondary battery anode particle; **hydrogen storage** alloy anode particle
IT Rare earth oxides
(particles, base **hydrogen storage** alloy particles coated with, for battery anode)
IT Anodes
(battery, **hydrogen storage** alloy particles with coatings for)
IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 12641-38-2 73482-78-7 155730-94-2
(catalyst particles, base **hydrogen storage** alloy particles coated with, for battery anode)
IT 9002-84-0, Ptfe 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer
(coating of, on **hydrogen storage** alloy anodes, in alk. secondary batteries)
IT **139634-80-3 155730-93-1**
(**hydrogen-absorbing**, anode contg., particulate and coated, in alk. secondary batteries)
IT 1306-19-0, Cadmium oxide, uses 1306-38-3, Cerium oxide, uses 1309-48-4, Magnesium oxide, uses 1312-81-8, Lanthana 1313-96-8, Niobium oxide 1314-13-2, Zinc oxide, uses 1314-23-4, Zirconium oxide, uses 1314-35-8, Tungsten oxide, uses 1314-61-0, Tantalum oxide 1332-37-2, Iron oxide, uses 1344-28-1, Alumina, uses 1344-70-3, Copper oxide 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses **7440-03-1**, Niobium, uses **7440-32-6**, Titanium, uses **7440-44-0**, **Carbon**, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses

7631-86-9, Silicon oxide, uses 11098-99-0, Molybdenum oxide 11099-02-8, Nickel oxide 11099-11-9, Vanadium oxide 11104-61-3, Cobalt oxide 11113-77-2, Palladium oxide 11113-84-1, Ruthenium oxide 11118-57-3, Chromium oxide 11129-60-5, Manganese oxide 11129-89-8, Platinum oxide 12055-23-1, Hafnium oxide 13463-67-7, Titania, uses 20667-12-3, Silver oxide
(particles, **base hydrogen storage** alloy particles coated with, for battery anode)

L69 ANSWER 24 OF 28 HCA
107:221733 Manufacture of **fine** metal **powders.**
Bogdanovic, Borislav; Boennemann, Helmut (Studiengesellschaft Kohle m.b.H., Fed. Rep. Ger.). Ger. Offen. DE 3541633 A1 19870527, 6 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1985-3541633 19851126.

AB The powders are prepd. by the reaction of Group 7-12 (IB, IIB, VIIB and VIII) metal salts in a solvent, optionally in presence of an inorg. support, with Mg contg. a catalytic amt. of anthracene and/or Mg anthracene or their alkyl or aryl derivs. The particle size of Mg is .ltoreq.0.3 (esp. .ltoreq.0.05 mm), the solvent is THF, and the support is SiO2, Al2O3, MgO, **activated C**, or excess Mg. The metal powder deposited on the support is used as a heterogeneous catalyst, and the metal (Co, Pt, Cr, Fe, and esp. Ni) powders alloyed with an excess Mg support are used for **H storage.** Thus, anthracene (0.36 g, 2 mmol) and 2 drop EtBr were added to a suspension of powd. Mg (50 mesh, 0.49 g, 20 mmol) in 200 mL THF and stirred at .apprx.20.degree. until pptn. of Mg anthracene, then NiCl2 (2.6 g, 20 mmol) was added and the suspension was stirred at .apprx.20.degree. for 28 h. A black ppt. was filtered, washed 3-5 times with THF, and dried at 10-3 torr to obtain 1.56g black pyrophoric powder having sp. surface area 7.2 m2/g and contg. Ni 78.9, Mg 2.7, C 12.5, H 1.3, and Cl 1.1%.

IT **110633-91-5P**
(catalyst powders, manuf. of, by reducing metal salts with magnesium)

RN 110633-91-5 HCA

CN Magnesium alloy, base, Mg 97,Ni 1,H 0.7,C 0.6,Cl 0.2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	97	7439-95-4
Ni	1	7440-02-0
H	0.7	12385-13-6
C	0.6	7440-44-0
Cl	0.2	22537-15-1

IT **110618-29-6P 110618-30-9P 110633-87-9P**

110633-89-1P 110689-35-5P
(manuf. of powd., anthracene-activated magnesium in)
RN 110618-29-6 HCA
CN Nickel alloy, base, Ni 79,C 12,Mg 2.7,H 1.3,Cl 1.1 (9CI) (CA INDEX NAME)
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 110618-30-9 HCA
CN Iron alloy, base, Fe 78,Mg 11,C 9.4,H 1.2 (9CI) (CA INDEX NAME)
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 110633-87-9 HCA
CN Copper alloy, base, Cu 98,Cl 1.6,Mg 0.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Cu	98	7440-50-8
Cl	1.6	22537-15-1
Mg	0.3	7439-95-4

RN 110633-89-1 HCA
CN Copper alloy, base, Cu 95,Br 4.2,C 1.3,H 0.4,Mg 0.4 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Cu	95	7440-50-8
Br	4.2	10097-32-2
C	1.3	7440-44-0
H	0.4	12385-13-6
Mg	0.4	7439-95-4

RN 110689-35-5 HCA
CN Cobalt alloy, base, Co 87,C 7,Mg 3.7,Cl 3.5,H 0.8 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Co	87	7440-48-4
C	7	7440-44-0
Mg	3.7	7439-95-4
Cl	3.5	22537-15-1
H	0.8	12385-13-6

IT **110633-90-4P**, Magnesium 99, nickel 1.3
(manuf. of powd., for hydroen storage)
RN 110633-90-4 HCA

CN Magnesium alloy, base, Mg 99,Ni 1.3 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mg	99	7439-95-4
Ni	1.3	7440-02-0

IT **1333-74-0P, Hydrogen,** preparation
(**storage** of, magnesium-nickel alloy powder for, manuf. of)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

IC ICM B22F009-18
CC 56-4 (Nonferrous Metals and Alloys)
Section cross-reference(s): 52, 67
ST nickel magnesium alloy powder manuf; magnesium anthracene metal powder manuf; catalyst metal powder manuf; **hydrogen storage** alloy powder manuf
IT Absorbents
(magnesium-nickel alloy powder for **hydrogen storage**)
IT **110633-91-5P**
(catalyst powders, manuf. of, by reducing metal salts with magnesium)
IT 120-12-7, Anthracene, uses and miscellaneous 50594-04-2, Magnesium anthracene
(catalysts, in manuf. of **fine** metal **powders** by redn. of metal salt with magnesium)
IT **110618-29-6P 110618-30-9P** 110633-86-8P **110633-87-9P** 110633-88-0P **110633-89-1P 110689-35-5P**
(manuf. of powd., anthracene-activated magnesium in)
IT **110633-90-4P,** Magnesium 99, nickel 1.3
(manuf. of powd., for hydroen storage)
IT **1333-74-0P, Hydrogen,** preparation
(**storage** of, magnesium-nickel alloy powder for, manuf. of)

L69 ANSWER 25 OF 28 HCA COPYRIGHT 2004 ACS on STN
106:123090 Batteries and amorphous metal alloy anodes for use in acid environments. Harris, Jonathan H.; Tenhover, Michael A. (Standard Oil Co., USA). Eur. Pat. Appl. EP 197680 A2 19861015, 20 pp. DESIGNATED STATES: R: BE, DE, FR, GB, IT, NL, SE. (English).

CODEN: EPXXDW. APPLICATION: EP 1986-301956 19860318. PRIORITY: US 1985-718256 19850401.

AB An acid-electrolyte secondary battery uses an anode of amorphous AaMbM'c alloy for reversible **H storing**, where A = Pd, Ag, Au, Cu, Hg and/or Pt; M = Pb, Ru, Cr, Mo, Si, W, Ni, Al, Sn, Co, Fe, Zn, Cd, Ga and/or Mn; M' = Ca, Mg, Ti, Y, Zr, Hf, Nb, V, Ta, and/or rare earth metals; a = .apprx.0.005-0.80, b .ltorsim.0.70, and c = .apprx.0.08-0.95. A **H-absorbing** anode of **sputtered** amorphous Pd12Mo30Ti58 alloy was used in a battery with a **graphite** counterelectrode and 2N H2SO4 electrolyte. The anode did not show any corrosion throughout .apprx.200 cycles and demonstrated (H:alloy ratio r = 1.1) a charge d. of 444 mA-h/g and 3064 mA-h/cm3. The resp. values for a cryst. Pd control anode (r = 0.55) were 139 mA-h/g and 1668mA-h/cm3.

IT **106607-31-2 106607-32-3 106607-33-4**
106607-34-5 106607-36-7 106607-37-8
(**hydrogen-absorbing** amorphous, anodes, for acid-electrolyte batteries)

RN 106607-31-2 HCA

CN Molybdenum alloy, base, Mo 42,Ti 40,Pd 18 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Mo	42	7439-98-7
Ti	40	7440-32-6
Pd	18	7440-05-3

RN 106607-32-3 HCA

CN Tungsten alloy, base, W 58,Ti 30,Pd 11 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
W	58	7440-33-7
Ti	30	7440-32-6
Pd	11	7440-05-3

RN 106607-33-4 HCA

CN Titanium alloy, base, Ti 61,Fe 20,Pd 19 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	61	7440-32-6
Fe	20	7439-89-6
Pd	19	7440-05-3

RN 106607-34-5 HCA
CN Titanium alloy, base, Ti 75,Ni 21,Pd 4.2 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	75	7440-32-6
Ni	21	7440-02-0
Pd	4.2	7440-05-3

RN 106607-36-7 HCA
CN Tungsten alloy, base, W 45,Ti 41,Ag 13 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
W	45	7440-33-7
Ti	41	7440-32-6
Ag	13	7440-22-4

RN 106607-37-8 HCA
CN Titanium alloy, base, Ti 64,Mo 24,Cu 12 (9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Ti	64	7440-32-6
Mo	24	7439-98-7
Cu	12	7440-50-8

IC ICM H01M004-38
ICS H01M010-34
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen storage** battery anode; molybdenum titanium alloy hydrogen anode; palladium titanium alloy hydrogen anode; titanium amorphous alloy hydrogen anode
IT Metallic glasses
(titanium alloys, **hydrogen-absorbing**, anodes, for acid-electrolyte batteries)
IT Anodes
(battery, **hydrogen-absorbing** amorphous titanium alloy, acid-electrolyte)
IT **106607-31-2** **106607-32-3** **106607-33-4** **106607-34-5** 106607-35-6 **106607-36-7** **106607-37-8** 107373-66-0 107373-67-1
(**hydrogen-absorbing** amorphous, anodes, for

acid-electrolyte batteries)

L69 ANSWER 26 OF 28 HCA COPYRIGHT 2004 ACS on STN
100:167158 Surface analysis using scattered primary and recoiled secondary neutrals and ions by TOF and ESA techniques. Rabalais, J. Wayne; Schultz, J. Albert; Kumar, Ranjit (Dep. Chem., Univ. Houston, Houston, TX, 77004, USA). Nuclear Instruments & Methods in Physics Research, 218(1-3), 719-26 (English) 1983. CODEN: NIMRD9. ISSN: 0167-5087.

AB A spectrometer system for simultaneous mass, velocity, and energy anal. of scattered and **sputtered** ions and velocity anal. of fast neutrals ejected from a surface by bombardment with a pulsed, mass selected ion beam is described. Combination secondary ion and scattered neutral plus ion time-of-flight (TOF) spectra are presented. Electrostatic sector anal. (ESA) coupled with the TOF technique is used to obtain energy distributions of scattered and **sputtered** ions and TOF/ESA spectra. The neutralization probability of scattered ions, i.e. the fraction of particles surviving a scattering collision as ions, is obtained by collection of spectra of neutrals plus ions and neutrals alone. TOF and ESA spectra are used to illustrate the measurement of particles scattered and **sputtered** by direct recoils and surface recoils. The feasibility of detecting such fast **sputtered** neutrals without postionization is demonstrated. TOF spectra of scattered primary and fast recoiled surface neutrals and ions from selected He+, Ne+, and Ar+ bombardment of CsBr, Ge, GeO2, H2O adsorbed on Ge, and clean and adsorbate covered La are presented. Ion fractions are detd. for scattered and recoiled particles and the significance of Auger and resonant neutralization channels is demonstrated. **Adsorbed H** and O are detected by surface recoiling and direct recoiling processes.

IT **7440-44-0**, analysis
(detection of adsorbed, on lanthanum, time-of-flight quadrupole mass spectrometric)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7439-91-0**, analysis
(surface anal. of, by time-of-flight quadrupole mass spectrometry)

RN 7439-91-0 HCA

CN Lanthanum (8CI, 9CI) (CA INDEX NAME)

La

CC 79-1 (Inorganic Analytical Chemistry)
IT 1333-74-0, analysis **7440-44-0**, analysis 7782-44-7, analysis
(detection of adsorbed, on lanthanum, time-of-flight quadrupole mass spectrometric)
IT 1310-53-8, analysis **7439-91-0**, analysis 7440-56-4, analysis
(surface anal. of, by time-of-flight quadrupole mass spectrometry)

L69 ANSWER 27 OF 28 HCA COPYRIGHT 2004 ACS on STN
99:29866 Sorption and electrochemical properties of palladium and platinum films of different thickness. Rivera Garcia, A. E. (USSR). Deposited Doc., VINITI 3814-Pt.2-82, 78-81 Avail. VINITI (Russian) 1982.
AB The **adsorption** of **H** and O and the evolution of H were studied on thin films of Pt and Pd deposited on glassy C, Ni and Ti. The films were deposited by an electroless process from solns. using hydrazine as the reducing agent. The grain size of the deposited metals was 100-300 .ANG.. The electrochem. measurements were conducted in 1N H2SO4 and 0.1N NaOH using an earlier described method. Potentiodynamic curves characterizing the desorption of O and **adsorption** of **H** are shown. The special electrochem. properties of films of Pd and Pt on substrates are caused to a significant extent by the **small grain** size. Activation of the substrate under the effect of such films does not play a decisive role.
IT **1333-74-0**, properties
(**adsorption** of, by palladium and platinum films of different thicknesses)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

IT **7440-44-0**, uses and miscellaneous
(glassy, sorption and electrochem. properties of palladium and platinum films of different thickness on)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IT **7440-32-6**, properties
(sorption and electrochem. properties of palladium and platinum

films on)
RN 7440-32-6 HCA
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

CC 72-2 (Electrochemistry)
Section cross-reference(s): 66, 67
IT Electrolytic polarization
(of **adsorption** of **hydrogen** and desorption of oxygen on palladium and platinum films of different thickness in acid and alk. solns.)
IT **Adsorption**
(of **hydrogen**, by palladium and platinum films of different thicknesses)
IT **1333-74-0**, properties
(**adsorption** of, by palladium and platinum films of different thicknesses)
IT **7440-44-0**, uses and miscellaneous
(glassy, sorption and electrochem. properties of palladium and platinum films of different thickness on)
IT **7440-32-6**, properties
(sorption and electrochem. properties of palladium and platinum films on)

L69 ANSWER 28 OF 28 HCA
92:61047 Separation of granular adsorbents from slurries. Yokota, Noriyuki; Tokuda, Shingo; Matsushita, Hiroshi; Mada, Shigeo (Osaka Soda Co., Ltd., Japan). Jpn. Tokkyo Koho JP 54024985 B4 19790824 Showa, 3 pp. (Japanese). CODEN: JAXXAD. APPLICATION: JP 1972-29909 19720325.
AB Slurries contg. $Mg(OH)_2$ are mixed with ion-exchange resins, **activated C**, bone **carbon**, silica gel, or zeolite to adsorb the heavy metals (e.g., Hg, Fe, Cu, and Cd), and the mixts. are filtered with a vertical column having holes **smaller** than the **granular** adsorbents to sep. the granular adsorbents from the slurry, and a portion of the filtered slurry is sprayed tangentially on the filtration surface to prevent the coagulation. Thus, a slurry contg. Hg 72 ppm, $CaSO_4$ 5.7, NaCl 17.2, H_2O 71.3, and $Mg(OH)_2$ 1.9% was mixed with a strongly basic ion-exchange resin (297-1190 .mu.) for 3 **h** to **adsorb** the Hg. The mixt. was filtered with a vertical column having 208-.mu. holes to obtain a filtered slurry contg. 1.5 ppm Hg.
IC B01D015-00; B03B005-00
CC 48-1 (Unit Operations and Processes)

=> d l70 1-23 cbib abs hitstr hitind

L70 ANSWER 1 OF 23 HCA COPYRIGHT 2004 ACS on STN
139:222974 Synthesis of carbon **nanotubes** by pyrolysis of acetylene using alloy hydride materials as catalysts and their **hydrogen adsorption** studies. Shaijumon, M. M.; Ramaprabhu, S. (Alternate Energy Technology and Magnetic Materials Laboratory, Department of Physics, Indian Institute of Technology Madras, Chennai, 600 036, India). Chemical Physics Letters, 374(5,6), 513-520 (English) 2003. CODEN: CHPLBC. ISSN: 0009-2614. Publisher: Elsevier Science B.V..

AB The catalytic synthesis of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides is discussed. The alloy-hydrides were prepd. using hydrogen decrepitation technique. The samples were purified by acid and heat treatment and were characterized by XRD, BET surface area measurements, SEM, TEM, and Raman spectroscopy. A max. adsorption capacity of 3.3 and 3.1 wt% are obtained at 298 K and 100 bar for carbon **nanotubes** prepd. with Mm-based **AB5** and Zr-based **AB2 hydrogen storage** alloy hydride catalysts, resp.

IT **7440-44-0P**, Carbon, preparation
(**nanotubes**; catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides and **hydrogen storage** properties)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 78-1 (Inorganic Chemicals and Reactions)
Section cross-reference(s): 52, 67

ST carbon **nanotube** prepn acetylene pyrolysis alloy hydride catalyst

IT Catalysts
(**AB2** and **AB5** alloy hydride; catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT **Adsorption**
(**hydrogen**; of carbon **nanotubes** prepd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT IR spectra
Surface area

(of carbon **nanotubes** prepd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT 74-86-2, Acetylene, reactions
(catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT 1333-74-0, **Hydrogen,** properties
(**hydrogen storage** properties of carbon **nanotubes** prepd. by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides)

IT **7440-44-0P,** Carbon, preparation
(**nanotubes;** catalytic prepn. of carbon **nanotubes** by pyrolysis of acetylene over Zr-based **AB2** and Mm (Misch metal)-based **AB5** alloy hydrides and **hydrogen storage** properties)

L70 ANSWER 2 OF 23 HCA COPYRIGHT 2004 ACS on STN

139:182832 AC impedance studies on **AB5** metal hydride electrodes. Begum, S. Nathira; Manimaran, K.; Renganathan, N. G.; Raghavan, M. (Central Electrochemical Research Institute, Karaikudi, 630 006, India). Transactions of the SAEST, 38(2), 89-90 (English) 2003. CODEN: TSETA6. ISSN: 0036-0678. Publisher: Society for Advancement of Electrochemical Science and Technology.

AB The metal hydride battery is a promising rechargeable battery. The active material in the battery anode is a metal hydride with **H** being **stored** in an alloy. **H-storage** alloys tend oxidize and pulverize in the alk. environment and its ability to **absorb** and desorb **H** is then lost. This study compared the electrochem. characteristics of metal hydride electrodes of varying compn. using electrochem. impedance spectroscopy. The study results are used to develop anodes with the optimum compn., suitable for high-energy applications.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

IT **Carbon black,** uses
Fluoropolymers, uses
(anode contg.; electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries with)

IT Battery anodes
Electric impedance
(electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries)

IT Hydrides
(electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries)

IT 9002-84-0, PTFE 13463-39-3, Nickel carbonyl
(anode contg.; electrochem. impedance spectroscopy of **AB5** metal hydride anodes for batteries with)

L70 ANSWER 3 OF 23 HCA COPYRIGHT 2004 ACS on STN
139:9260 Electrochemical properties of MmNi3.6Co0.7Al0.3Mn0.4 alloy containing carbon **nanotubes**. Li, Shang; Pan, Guiling; Zhang, Ying; Gao, Xueping; Qu, Jingqiu; Yan, Jie; Wu, Feng; Song, Deying (Institute of New Energy Material Chemistry, Nankai University, Tianjin, 300071, Peop. Rep. China). Journal of Alloys and Compounds, 353(1-2), 295-300 (English) 2003. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science B.V..

AB MmNi3.6Co0.7Al0.3Mn0.4 alloys contg. carbon **nanotubes** were prepd. by an arc-melting method. A few carbon **nanotubes** coated or uncoated with **AB5** alloy stuck out of the surface of the alloy. The effects of the addn. of carbon **nanotubes** on the structure and the electrochem. characteristics of **AB5** -type alloy were investigated by XRD and electrochem. measurements. Discharge plateau curves of sigmoid shape were clearly obsd. for **AB5**-CNT electrodes during the initial activation, which was different from the original **AB5** electrode. With the addn. of carbon **nanotubes**, the unit cell vol. decreased resulting in a decrease of the stability of the metal hydride and an increase in the discharge plateau potential. The discharge capacity for the alloys decreased with decreasing stability of the metal hydride due to the decrease of max. amt. of the **absorbed hydrogen**, but the high-rate dischargeability was improved due to the increase in the rate of hydrogen diffusion in the alloys. The capacity retaining ability of the alloys did not remarkably decrease with the addn. of carbon **nanotubes**.

IT **7440-44-0**, Carbon, processes
(**nanotubes**; electrochem. properties of MmNi3.6Co0.7Al0.3Mn0.4 alloy contg. carbon **nanotubes**)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **hydrogen storage** carbon **nanotubes**
AB5 type alloy

IT 1333-74-0, Hydrogen, processes 156180-55-1
(electrochem. properties of MmNi3.6Co0.7Al0.3Mn0.4 alloy contg. carbon **nanotubes**)

IT **7440-44-0**, Carbon, processes
(**nanotubes**; electrochem. properties of MmNi3.6Co0.7Al0.3Mn0.4 alloy contg. carbon **nanotubes**)

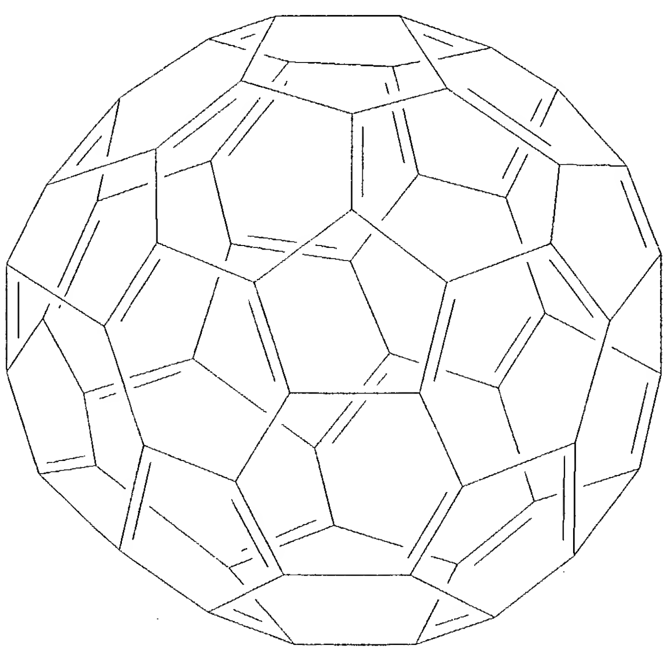
L70 ANSWER 4 OF 23 HCA COPYRIGHT 2004 ACS on STN
137:203878 Electrochemical **hydrogen storage** into LaNi5 using a **fullerene**-based proton conductor. Maruyama, Ryuichiro (Frontier Science Laboratories, Sony Corporation, Yokohama, 240-0036, Japan). Electrochemical and Solid-State Letters, 5(5), A89-A91 (English) 2002. CODEN: ESLEF6. ISSN: 1099-0062. Publisher: Electrochemical Society.

AB Hydrogen was electrochem. compressed using the membrane electrode assembly (MEA) film of hydrogen sulfated **fullerenol** [C60(OSO3H)n(OH)n]. The material works as proton conductor without further humidification at ambient temp. Hydrogen was compressed up to 1 MPa using one MEA. The amt. of compressed hydrogen and the potential to compress hydrogen followed the Faraday's law and Nernst equation. Thus, the storage of the electrochem. compressed hydrogen in an **AB5**-type alloy was confirmed.

IT **99685-96-8D, Fullerene** (C60), hydrogen sulfated derivs.
(proton conductor; electrochem. **hydrogen** compression and **storage** into LaNi5 using a **fullerene** -based proton conductor)

RN 99685-96-8 HCA

CN [5,6]Fullerene-C60-Ih (9CI) (CA INDEX NAME)



IT **1333-74-0, Hydrogen,** processes
(**storage;** electrochem. **hydrogen** compression

and **storage** into LaNi5 using a **fullerene**
-based proton conductor)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **hydrogen** electrochem compression **storage**
lanthanum nickel; proton conductor lanthanum nickel **hydrogen**
storage compression; **fullerene** hydrogen sulfate
lanthanum nickel **hydrogen storage**
IT Compression
(electrochem.; electrochem. **hydrogen** compression and
storage into LaNi5 using a **fullerene**-based
proton conductor)
IT **Fullerenes**
(hydrogen sulfate derivs., proton conductor; electrochem.
hydrogen compression and **storage** into LaNi5
using a **fullerene**-based proton conductor)
IT Ionic conductors
(proton; electrochem. **hydrogen** compression and
storage into LaNi5 using a **fullerene**-based
proton conductor)
IT 12196-72-4, Lanthanum, compd. with nickel (1:5)
(**hydrogen storage** alloy; electrochem.
hydrogen compression and **storage** into LaNi5
using a **fullerene**-based proton conductor)
IT **99685-96-8D, Fullerene** (C60), hydrogen sulfated
derivs.
(proton conductor; electrochem. **hydrogen** compression
and **storage** into LaNi5 using a **fullerene**
-based proton conductor)
IT **1333-74-0, Hydrogen,** processes
(**storage**; electrochem. **hydrogen** compression
and **storage** into LaNi5 using a **fullerene**
-based proton conductor)

L70 ANSWER 5 OF 23 HCA COPYRIGHT 2004 ACS on STN
136:312404 Properties of pellet- and paste-type electrodes of
AB5 hydrogen storage alloy. Park,
Choong-Nyeon; Lee, Ho-Jun; Jung, So-Ri (Department of Metallurgical
Engineering, Chonnam National University, Kwangju, 500-757, S.
Korea). Journal of Alloys and Compounds, 330-332, 821-824 (English)
2002. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science
S.A..
AB The discharge capacities of pellet- and paste-type **AB5**

alloy electrodes were investigated. The LmNi3.6Al0.4Co0.7Mn0.3 alloy was chosen and the alloy powder was coated with various amts. of copper by the electroless plating method. The pellet-type electrodes were fabricated by cold pressing the copper-coated alloy powder into disks of 10 mm diam. without any binding material and the paste-type electrodes were prepd. by pasting the bare or the copper-coated alloy powders onto the foamed nickel with some org. binders. The discharge capacities of the electrodes were measured through half cell tests. The exptl. results showed that for the pellet-type electrodes, as the amt. of copper coat increased the discharge capacity per wt. of electrode decreased whereas that per wt. of alloy increased. For the paste-type electrodes the copper coated alloy powder showed a much higher discharge capacity than the bare alloy powder. However, the increase of the copper coat over a certain amt. did not increase the discharge capacity per wt. of alloy while decreasing that per wt. of electrode. Considering the discharge capacity and mech. endurance, the most promising electrode was the paste-type electrode with 2.5 wt.% Cu-coated alloy powder and no **carbon black**.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery anode **AB5** type alloy

IT Battery anodes
(properties of pellet- and paste-type electrodes of **AB5** **hydrogen storage** alloy)

IT 156186-74-2
(properties of pellet- and paste-type electrodes of **AB5** **hydrogen storage** alloy)

L70 ANSWER 6 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:306316 Fuel cell system comprising adsorption device for the removal of gas components. Klein, Christian; Schuessler, Martin (Xcellsis G.m.b.H., Germany). Eur. Pat. Appl. EP 1148568 A2 20011024, 6 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (German). CODEN: EPXXDW. APPLICATION: EP 2001-108595 20010405. PRIORITY: DE 2000-10019772 20000420.

AB The variations in concn. of gas components in fuel gas flows of fuel cell systems are regulated by an adsorption device. The adsorption device adsorbs the gas component under an increased partial pressure, and releases the gas component exposed to a decreased partial pressure. The adsorption device is placed in the fuel gas conduit, between the reformer (gas generation) and the oxidn. catalyst (gas purifn.), whereby CO, water vapor, and **H2** can be **adsorbed**. The adsorption material contains CuY, CuZSM-5, **activated carbon**, Al2O3, silica gel, zeolites, or an alloy, which is selected from AB, **AB2**, **A2B**, **AB5**; A = Mg, Ca, Ti, Zr, V, or La; B = Mn, Fe, Co, Ni, or Cu.

IT 7440-44-0, **Activated carbon**, uses
(**activated**; fuel cell system comprising adsorption device for the removal of gas components)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M008-04
ICS H01M008-06
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell carbon monoxide **hydrogen adsorption**
IT 7440-44-0, **Activated carbon**, uses
(**activated**; fuel cell system comprising adsorption device for the removal of gas components)

L70 ANSWER 7 OF 23 HCA COPYRIGHT 2004 ACS on STN
135:275229 **Hydrogen absorption** characteristics and electrochemical properties of Ti substituted Zr-based **AB2** alloys. Visintin, A.; Peretti, H. A.; Tori, C. A.; Triaca, W. E. (Facultad de Ciencias Exactas, Instituto de Investigaciones Fisicoquimicas Teoricas y Aplicadas, Universidad Nacional de La Plata, La Plata, 1900, Argent.). International Journal of Hydrogen Energy, 26(7), 683-689 (English) 2001. CODEN: IJHEDX. ISSN: 0360-3199. Publisher: Elsevier Science Ltd..
AB The **hydrogen absorption** characteristics of Zr1-xTixCrNi alloys, with x ranging between 0.1 and 0.4, were studied by volumetric and electrochem. techniques in order to det. their possible application as the neg. electrode in nickel/metal-hydride rechargeable batteries. Electrodes of alloy powders mixed with different compacting additives were tested with respect to charge and discharge cycles in KOH soln. The effects of the electrode-compacting additive, discharge rate and temp. on the electrode discharge capacity were also investigated. The results obtained show that: (i) at 80.degree.C the equil. pressures of Zr1-xTixCrNi alloys with x=0.1 are 2.6 times higher than those for the unsubstituted ZrCrNi alloy, while maintaining a good **hydrogen storage** capacity; (ii) the Zr0.9Ti0.1CrNi alloy electrodes exhibit the highest discharge capacities and the best performances during fast charge-discharge cycling; (iii) the Ti substituted alloy electrodes using copper powder as compacting material show faster **activation**, while **carbon** -Teflon compacted electrodes exhibit the best cycle life behavior; (iv) for all Ti substituted alloy electrodes the discharge capacities increase with temp.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
IT **Absorption**

Battery cathodes
Secondary batteries
(**hydrogen absorption** characteristics and electrochem. properties of Ti substituted Zr-based **AB2** alloys)

IT 1333-74-0, **Hydrogen**, processes 168018-65-3 221335-84-8 282731-85-5 362531-81-5
(**hydrogen absorption** characteristics and electrochem. properties of Ti substituted Zr-based **AB2** alloys)

L70 ANSWER 8 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:244903 The performances of proto-type Ni/MH secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni. Lee, Sang-Min; Lee, Ho; Kim, Jin-Ho; Lee, Paul S.; Lee, Jai-Young (Department of Material Science and Engineering, Korea Advanced Institute of Science and Technology, Taejon, 305-701, S. Korea). Metals and Materials International, 7(2), 181-186 (English) 2001. CODEN: MMIECY. Publisher: Korean Institute of Metals and Materials.

AB For the purpose of developing a Zr-based Laves phase alloy with higher capacity and better performance for electrochem. application, extensive work has been carried out. After careful alloy design of ZrMn2-based **hydrogen storage** alloys through varying their stoichiometry by means of substituting or adding alloying elements, the Zr0.9Ti0.1(Mn0.7V0.5Ni1.4)0.92 with high capacity (392 mAh/g at the 0.25C) and improved performance (comparable to that of commercialized **AB5** type alloy) was developed. Another endeavor was made to improve the poor activation property and the low rate capability of the developed Zr-based Laves phase alloy for commercialization. The combination method of hot-immersion and slow-charging was introduced. It was found that electrode activation was greatly improved after hot immersion at 80.degree.C for 12 h followed by charging at 0.05C. The effects of this method are discussed in comparison with other activation methods. The combination method was successfully applied to the formation process of 80 Ah Ni/MH cells. A series of systematic investigations has been rendered to analyze the inner cell pressure characteristics of a sealed type Ni-MH battery. It was found that the increase of inner cell pressure in the sealed type Ni/MH battery of the above-mentioned Zr-Ti-Mn-V-Ni alloy was mainly due to the accumulation of oxygen gas during charge/discharge cycling. The fact identified that the surface catalytic activity was affected more dominantly by the oxygen recombination reaction than the reaction surface area was also identified. In order to improve the surface catalytic activity of a Zr-Ti-Mn-V-Ni alloy, which is closely related to the inner pressure behavior in a sealed cell, the electrode was fabricated by mixing the alloy with Cu powder and a

filamentary type of Ni and replacing 75% of the **carbon black** with them; thus, the inner cell pressure rarely increases with cycles due to the active gas recombination reaction. Measurements of the surface area of the electrode and the surface catalytic activity showed that the surface catalytic activity for the oxygen recombination reaction was greatly improved by the addn. of Cu powder and the filamentary type of Ni. Finally, we have collaborated with Hyundai Motors Company on fabrication of the 80 Ah cells for Elec. Vehicles and evaluated the cell performance.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 72

ST nickel metal hydride battery zirconium alloy anode; **hydrogen storage** zirconium alloy anode

IT Battery anodes
Secondary batteries
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)

IT 360559-18-8
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)

IT 1333-74-0, Hydrogen, processes
(performances of proto-type nickel-metal hydride secondary batteries using Zr-based **hydrogen storage** alloys and filamentary type Ni)

L70 ANSWER 9 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:229248 Effect of nickel, cobalt or **graphite** addition on the electrochemical properties of an **AB5 hydrogen storage** alloy and their mechanism. Yuan, A.; Xu, N. (Shanghai Institute of Metallurgy, Chinese Academy of Sciences, Shanghai, 200050, Peop. Rep. China). Journal of Alloys and Compounds, 322(1-2), 269-275 (English) 2001. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..

AB The effects of the addn. of cobalt powder, nickel powder and **graphite** to metal hydride (MH) electrode have been investigated by using the const. current charge/discharge test. Electrochem. impedance spectroscopy, linear polarization and cyclic voltammetry methods were used to study the mechanism for the property variation. Cobalt powder addn. can increase the MH electrode capacity at lower charge/discharge rates, but decrease the capacity at higher charge/discharge rates. Nickel powder addn. is beneficial to the capacity and rate-discharge-ability due to the improvement of elec. conductance and electrocatalytic activity of the MH electrode. The performance of the MH electrode is slightly improved with the addn. of **graphite**. The lower-frequency semicircle obsd. in the Nyquist plot is suggested to be the reaction

impedance of the MH electrode.
IT **7782-42-5, Graphite,** processes
(effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)
RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **1333-74-0, Hydrogen,** processes
(**storage,**; effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H— H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST metal hydride electrode nickel cobalt **graphite hydrogen storage**
IT Electrodes
Storage
(effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)
IT Hydrides
(effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)
IT 7440-02-0, Nickel, processes 7440-48-4, Cobalt, processes **7782-42-5, Graphite,** processes 189453-81-4
(effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)
IT **1333-74-0, Hydrogen,** processes
(**storage,**; effect of nickel, cobalt or **graphite** addn. on the electrochem. properties of an **AB5 hydrogen storage** alloy and their mechanism)

L70 ANSWER 10 OF 23 HCA COPYRIGHT 2004 ACS on STN
134:313531 Carrying clean energy to the future - **hydrogen absorbing** materials. Bououdina, M.; Guo, Z. X. (Department of Materials, University of London, London, E1 4NS, UK). Materials Technology (Poulton-le-Fylde, United Kingdom), 15(4), 269-275

(English) 2000. CODEN: MATTEI. ISSN: 1066-7857. Publisher: Matrice Technology Ltd..

AB A review with no refs. This report outlines the pros and cons and promises of the title materials, with an aim of providing a balanced view of this rapidly developing technol. Details are given on: (1) metal, alkali metal, rare earth and alkali rare earth hydrides; (2) FeTi intermetallic compd.; (3) LaNi5 and related compds.; (4) **AB2** Laves phases; (5) **H storage** in quasicrystals; (6) sodium alanate and related hydrides; (7) Mg and Mg2Ni based hydrides; (8) single walled carbon **nanotubes** as potential **H storage** materials for elec. vehicles; (9) rare earth metals and related compds; (10) zeolites; (11) specific technol. applications; (12) operation of Ni-metal hydride batteries; and (13) comparison of MH electrodes of com. batteries.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST review **hydrogen absorbing** material

IT Energy
Materials
(**hydrogen absorbing** materials for clean energy to future)

IT Alloys, uses
Hydrides
Intermetallic compounds
(**hydrogen absorbing** materials for clean energy to future)

IT 1333-74-0, **Hydrogen**, uses
(**hydrogen absorbing** materials for clean energy to future)

L70 ANSWER 11 OF 23 HCA COPYRIGHT 2004 ACS on STN

134:74841 **Hydrogen storage** alloy/carbon nanometer tube composite **hydrogen storage** material. Gao, Xueping; Qin, Xue; Wu, Feng; Ye, Shihai; Liu, Hong; Yuan, Huatang; Song, Deying; Shen, Panwen (Nankai Univ., Peop. Rep. China). Faming Zhuanli Shenqing Gongkai Shuomingshu CN 1259584 A 20000712, 5 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 2000-100505 20000120.

AB The **hydrogen storage** material is composed of 1-90% **H-storage** alloy and 10-99% C **nanotubes**. The **H-storage** alloy is **AB5**-type alloy LNin-x-y-zCoxNyMz (L = rare earth mixt., La, Ce, Nd, Pr, or Y; N and/or M = Mn, V, Cr, Al, Fe, Cu, Zn, or Sn; n = 4-6; x, y, and/or z = 0-2), Laves **AB2**-type alloy KNia-b-c-dVbGcJd (K = Zr, Ti, Hf, rare earth mixt., La, Ce, Nd, Pr, or Y; G and/or J = Co, Mn, Cr, Al, Fe, Cu, Zn, or Sn; a = 1.2-2.8; b, c, and/or d = 0-2), AB-type alloy HNim-k-jFekPj (H = Zr or Hf; P = Co, Mn, V, Cr, Al, Cu, Zn, or Sn; m = 0.6-1.5; k = 0-1.5; and j =

0-1); and/or **A2B**-type alloy Mgg-fEfNil-p-qCopTq (E = Ca, Zr, Ti, Hf, rare earth mixt., La, Ce, Nd, Pr, or Y; T = Mn, V, Cr, Al, Fe, Cu, Zn, or Sn; g = 0.8-2.5; f = 0-1; and p and/or q = 0-0.6). The **H-storage** material is manufd. by: (1) passing a reactive gas (CH4, C2H4, etc.) through a sensitized powd. (particle diam. 10-20 .mu.m) catalyst (LaNi4.5Fe0.5, Mg2Ni, etc.) in a stationary bed at 723-1273.degree.K for 10-70 min, (2) passing the reactive gas through a powd. precursor of a metal catalyst in a stationary bed and allowing the prepd. composite to react with CaH2 or Ca in flowing Ar at 973-1273.degree.K for 1-5 h, or (3) milling a powd. **H-storage** alloy and C **nanotubes** in an aq. soln. contg. .ltoreq.2M F-.

IC C22C019-03

CC 56-4 (Nonferrous Metals and Alloys)
Section cross-reference(s): 52

ST **hydrogen storage** alloy carbon **nanotube** composite

IT Composites
Nanotubes
(**hydrogen storage** alloy/carbon nanometer tube composites for **hydrogen storage**)

IT 12057-65-7 109077-91-0 316167-05-2 316167-06-3
(compn.; **hydrogen storage** alloy/carbon nanometer tube composites for **hydrogen storage**)

IT 1333-74-0, **Hydrogen**, processes
(**hydrogen storage** alloy/carbon nanometer tube composites for **hydrogen storage**)

IT 316167-04-1
(**hydrogen storage** alloy/carbon nanometer tube composites for **hydrogen storage**)

L70 ANSWER 12 OF 23 HCA COPYRIGHT 2004 ACS on STN

133:337608 Electrochemical investigation of single-walled carbon **nanotubes** for **hydrogen storage**.
Rajalakshmi, N.; Dhathathreyan, K. S.; Govindaraj, A.; Satishkumar, B. C. (Guindy, 111 Mount Road, Centre for Electrochemical and Energy Research, SPIC Science Foundation, Madras, 600032, India).
Electrochimica Acta, 45(27), 4511-4515 (English) 2000. CODEN: ELCAAV. ISSN: 0013-4686. Publisher: Elsevier Science Ltd..

AB Electrodes made of purified and open single walled carbon **nanotubes** behave like metal hydride electrodes in Ni-MH batteries, showing high electrochem. reversible charging capacity up to 800 mAh g-1 corresponding to a **hydrogen storage** capacity of 2.9 wt% compared to known **AB5, AB2** metal hydride electrodes.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ST carbon **nanotubes hydrogen storage**
IT **Nanotubes**
(carbon; electrochem. investigation of single-walled carbon **nanotubes** for **hydrogen storage**)
IT Electric charge
(charge-discharge of single-walled carbon **nanotubes** electrodes for **hydrogen storage**)
IT **Storage**
(**hydrogen**; electrochem. investigation of single-walled carbon **nanotubes** for **hydrogen storage**
)
IT Electric capacitance
(of single-walled carbon **nanotubes** electrodes for **hydrogen storage**)
IT 1333-74-0, Hydrogen, properties
(electrochem. investigation of single-walled carbon **nanotubes** for **hydrogen storage**)

L70 ANSWER 13 OF 23 HCA COPYRIGHT 2004 ACS on STN
132:95684 Influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy. Shi, Jun; Tsukahara, Makoto; Takeshita, Hiroyuki T.; Kuriyama, Nobuhiro; Sakai, Tetsuo (New Energy and Industrial Technology Development Organization, Tokyo, 170-6028, Japan). Journal of Alloys and Compounds, 293-295, 716-720 (English) 1999. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier Science S.A..
AB Influences of carbon on microstructure and electrode properties were investigated for battery alloy $V_4TiNi_{0.65}Co_{0.05}Nb_{0.047}Ta_{0.047}$. With increasing carbon concn., the cycle-life of charge/discharge became longer. One of main factors that affected the cycle-life was the expansion and redn. of the (Ti,V)-based solid soln. phase. Cracks yielded in TiNi phase more easily than in other phases. V-based battery alloys were more hardly pulverized than **AB5** and **AB2** intermetallic compd. type materials.
IT **7440-44-0**, Carbon, uses
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST battery anode **hydrogen storage** alloy; vanadium titanium nickel anode hydriding; carbon effect vanadium titanium nickel alloy hydriding

IT Battery anodes
Hydriding
Microstructure
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)
IT 223438-70-8
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)
IT **7440-44-0**, Carbon, uses
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)
IT 1333-74-0, Hydrogen, uses
(influence of carbon on electrode properties of V-Ti-Ni type **hydrogen storage** alloy)

L70 ANSWER 14 OF 23 HCA COPYRIGHT 2004 ACS on STN
131:274163 Electrochemical segregation of the fluorinated **AB2** electrode during cycling. Toyoda, Eiji; Gao, Xueping; Sun, Yuanming; Nakajima, Tadaaki; Suda, Seijirau (Grad. Sch. Ind. Chem., Kogakuin Univ., Tokyo, 163-8677, Japan). Kogakuin Daigaku Kenkyu Hokoku, 86, 77-80 (Japanese) 1999. CODEN: KDKHAY. ISSN: 0368-5098. Publisher: Kogakuin Daigaku.
AB Improvement of the initial **activation** and electrochem. **C/D** cycle life of the Laves-phase **AB2** alloy are of basic importance for the application of hydriding alloy to Ni/MH batteries which exhibit larger discharge capacity than discharge capacity of **AB5**. Fluorination treatment used here was very effective for improving the initial activation and the max. discharge capacity of Laves-phase alloy by the redn. of metallic Ni. Exptl. anal. on the deterioration mechanism of the electrode was performed by an electrochem. impedance spectra, XRD, and ICP. After cycling, the alloy bulk still remained a capability of hydrogen by XRD anal., and the deterioration mechanism of the Laves-phase electrode was mainly considered to be surface process. In particular, the particle pulverization was made by increasing the sp. surface area obtained by BET, and by reducing the particle size obsd. by SEM. This pulverization was identified to be a main reason for causing deterioration of the electrode. Furthermore, the particle pulverization further increased the dissoln. rate of V and Mn, which was proportional to the sp. surface area by generating new fresh surface. The structure of the alloy surface layer destroyed by the particle pulverization and dissoln. of V and Mn contributed to the deterioration of Laves-phase electrode.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST battery anode **hydrogen absorbing** alloy;
zirconium nickel alloy anode hydriding
IT Battery anodes

Hydriding
Secondary batteries
(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

IT 147301-31-3
(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

IT 1333-74-0, Hydrogen, uses
(electrochem. segregation of fluorinated **AB2** electrode during battery cycling)

L70 ANSWER 15 OF 23 HCA COPYRIGHT 2004 ACS on STN

131:105400 **Hydrogen-absorbing** material composition suitable for battery anode. Suda, Seijirou (Hydrogen Energy Kenkyujo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 11181536 A2 19990706 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-353908 19971222.

AB The compn. comprises (a) a fluorinated **AB2**-, AB-, and/or BCC-type **H-absorbing** Ni-contg. alloy and (b) a fluorinated **AB5**-type **H-absorbing** Ni-contg. alloy. The compn. may contain fluorinated **carbon black**. The compn., suitable for a battery anode, has high H activity, excellent hydrogenation and electrochem. properties, long life, and high durability.

IC ICM C22C019-00
ICS B22F001-02; H01M004-24; H01M004-38

CC 56-3 (Nonferrous Metals and Alloys)
Section cross-reference(s): 52

ST **hydrogen absorbing** nickel alloy fluorinated compn; battery anode **hydrogen absorbing** alloy compn; **carbon black hydrogen absorbing** alloy fluorinated

IT Battery anodes
Fluorination
(fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT **Carbon black**, uses
(fluorinated, alloy compn. contg.; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT Alloys, uses
(nickel-contg., **hydrogen-absorbing**, fluorinated; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT 1333-74-0, **Hydrogen**, miscellaneous
(alloys **absorbing**; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

IT 82089-05-2D, fluoride 193678-39-6D, fluoride
(fluorinated **hydrogen-absorbing** alloy compn.

suitable for battery anode)
IT 7789-23-3, Potassium fluoride
(fluorinating agent; fluorinated **hydrogen-absorbing** alloy compn. suitable for battery anode)

L70 ANSWER 16 OF 23 HCA COPYRIGHT 2004 ACS on STN
131:104486 Effect of carbon additives on the electrochemical properties of **AB5 graphite** composite electrodes prepared by mechanical milling. Aymard, L.; Lenain, C.; Courvoisier, L.; Salver-Disma, F.; Tarascon, J-M. (Laboratoire de Reactivite et de Chimie des Solides, Universite de Picardie Jules Verne, Amiens, 80039, Fr.). Journal of the Electrochemical Society, 146(6), 2015-2023 (English) 1999. CODEN: JESOAN. ISSN: 0013-4651. Publisher: Electrochemical Society.
AB The effect of mech. milling on powder mixts. consisting of **graphite** and **AB5** alloys, prepd. either by mech. alloying or by a high-temp. melting process, has been investigated. The resulting hydride-forming composite electrodes show a 10 and 40% capacity enhancement for arc-melted and mech. prepd. **AB5** alloys, resp. Such an increase in capacity is suggested to be the result of several cumulative effects: (1) a mech. induced reducing role of **graphite** which eliminates the **AB5** particles of oxide coatings, enabling a better **hydrogen adsorption/absorption** and diffusion into the insertion sites of the alloy, (2) the appearance of an increasingly important double-layer capacitance on each particle with increased milling time that adds to the faradaic component, and (3) the improved electronic cond. between the active **AB5** material and the **graphite** that allows a better utilization of the alloy.
IT **7782-42-5, Graphite,** uses
(effect of carbon additives on electrochem. properties of **AB5 graphite** composite electrodes prepd. by mech. milling)
RN 7782-42-5 HCA
CN Graphite (8CI, 9CI) (CA INDEX NAME)

C

IT **7440-44-0,** Carbon, uses
(effect of carbon additives on electrochem. properties of **AB5 graphite** composite electrodes prepd. by mech. milling)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST battery anode alloy **graphite** composite; carbon additive
effect battery anode
IT Battery anodes
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
IT Machining
(milling; effect of carbon additives on electrochem. properties
of **AB5 graphite** composite electrodes prepd.
by mech. milling)
IT **7782-42-5, Graphite,** uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
IT **7440-44-0**, Carbon, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
IT 231607-37-7
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)
IT 1333-74-0, Hydrogen, uses
(effect of carbon additives on electrochem. properties of
AB5 graphite composite electrodes prepd. by
mech. milling)

L70 ANSWER 17 OF 23 HCA COPYRIGHT 2004 ACS on STN
130:314335 Electrochemical properties of Zr(VxNi1-x)3 as electrode
material in nickel-metal hydride batteries. Chartouni, Daniel;
Zuttel, Andreass; Nutzenadel, Christoph; Gross, Karl; Schlapbach,
Louis; Guther, Volker; Otto, Andreas (Institute of Physics,
University of Fribourg, Fribourg, CH-1700, Switz.). International
Journal of Hydrogen Energy, 24(2/3), 229-233 (English) 1999. CODEN:
IJHEDX. ISSN: 0360-3199. Publisher: Elsevier Science Ltd..
AB Zr-V-Ni based alloys represent one group of alloys with promising
properties for the use as **hydrogen absorbing**
electrodes in an alk. electrolyte. In particular, this group has
been studied because these alloys are effective in overcoming the
energy d. limitations of present **AB5** type alloys. We have
investigated the alloys Zr(VxNi1-x)3 in the range 0.29 .ltoreq. x
.ltoreq. 0.5 by means of SEM with electron probe X-Ray microanal.,

X-ray diffraction and electrochem. measurements. The alloys are composed of different crystallog. phases. The main phase (a C15 Laves phase, space group Fd3m) consists of all three elements and was found to be responsible for the high reversible capacity of a max. of 375 mAh/g. The second phase is vanadium-nickel **based** (b.c.c. structure, space group: Im3m). The discharge kinetics of this alloys was investigated in electrochem. expts. We obsd. an increase of the high rate dischargeability with increasing nickel content. This is mainly due to the catalytic effect of nickel for the **hydrogen absorption**-desorption process. The exchange c.d. increases with increasing nickel content. Furthermore, we obsd. a faster activation for the alloys with higher nickel content.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

ST battery anode **hydrogen absorption** alloy;
zirconium vanadium nickel alloy anode battery

L70 ANSWER 18 OF 23 HCA COPYRIGHT 2004 ACS on STN

127:250500 Effect of additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes. Visintin, Arnaldo; Smith, Dustin; Gamboa-Aldeco, Maria; Srinivasan, Supramaniam (Instituto Nacional de Investigaciones Fisicoquimica Teoricas y Aplicadas (INIFTA), Universidad Nacional de La Plata, La Plata, 1900, Argent.). Proceedings - Electrochemical Society, 97-18(Batteries for Portable Applications and Electric Vehicles), 780-786 (English) 1997. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.

AB The effect of carbon and nickel additives to the electrode on the electrochem. performance of a Ni-MHx alloy of the **AB5** type (MmNi4.1Co0.4Mn0.4Al0.3) is studied. Carbon with high microporosity such as Vulcan XC72, shows better discharge capacity of the electrode as compared to a carbon with low surface area, due to a better distribution of reactants in the hydriding/dehydriding reactions. Hydrophilicity of the carbon binder plays also an important role in the performance of the electrode. Electrodes treated with a wetting agent show larger discharge capacity as compared to those electrodes made with hydrophobic carbon. Addn. of high surface area Ni powder to the electrode improves its performance, possibly due to an increase of the electrocatalytic activity of the electrode for the water discharge step of the dehydriding reaction, and this effect increases with the amt. of nickel powder added to the electrode. Mech. compression of the electrode minimizes its phys. degrdn. during the charge/discharge cycles, and therefore improves its cyclic life performance.

IT **1333-74-0, Hydrogen,** processes
(**storage** of; effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance

of hydride electrodes)
RN 1333-74-0 HCA
CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 76
IT Fluoropolymers, uses
(**carbon black** contg.; effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)
IT Battery anodes
Secondary batteries
(effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)
IT **Carbon black,** uses
(effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)
IT 9002-84-0, Teflon
(**carbon black** contg.; effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)
IT 7440-02-0, Nickel, uses 195616-33-2
(effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)
IT **1333-74-0, Hydrogen,** processes
(**storage** of; effect of nickel and carbon additives to **AB5** alloys and of cell configuration on the performance of hydride electrodes)

L70 ANSWER 19 OF 23 HCA COPYRIGHT 2004 ACS on STN
124:186306 **Hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment.
Kitayama, Kohtarou; Komori, Dai; Liu, Fangjie; Uchida, Masaki; Suda, Seijirau (Kogakuin Univ., Tokyo, 163-91, Japan). Kogakuin Daigaku Kenkyu Hokoku, 78, 63-6 (Japanese) 1995. CODEN: KDKHAY. ISSN: 0368-5098. Publisher: Kogakuin Daigaku.
AB By the measurement of P-C-T (pressure-compn.-temp.) characteristics, by the observation with metallurgical microscope and x-ray diffraction anal., hydriding properties such as initial **activation** and P-**C**-T isothermal and the surface and bulk microstructures of Ti0.5-x/2Zr0.5-x/2(La/Ce)xMn0.8Cr0.8Ni0.4(x=0.05) were studied and compared with

those of non-La/Ce-substitution alloys. It was found that the addn. of La/Ce to the alloys improved an initial activity characters and the fluorination treatment further improved the character. The **hydrogen absorption** by La/Ce-substitution was also discussed.

CC 66-3 (Surface Chemistry and Colloids)
Section cross-reference(s): 56

ST **hydrogen absorption** chromium manganese nickel alloy

IT **Absorption**
(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 1333-74-0, **Hydrogen**, processes
(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 174177-76-5
(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

IT 7782-41-4, Fluorine, reactions
(**hydrogen absorption** mechanism of La/Ce-substituted **AB2**-type alloys by means of F-treatment)

L70 ANSWER 20 OF 23 HCA

124:150854 Effects of Ni-substitution and F-treatment on the hydriding behaviors and microstructures of **AB2**-compound (Ti,Zr)(Mn,Cr)2. Liu, F.-J.; Suda, S.; Sandrock, G. (Kogakuin University, Department of Chemical Engineering, Chemical Energy Laboratory, 2665-1, Nakano-machi, Hachioji-shi, Tokyo, 192, Japan). Journal of Alloys and Compounds, 232(1-2), 232-7 (English) 1996. CODEN: JALCEU. ISSN: 0925-8388. Publisher: Elsevier.

AB The effects of Ni-content and F-treatment of **AB2** compds. Ti0.5Zr0.5(Mn0.5Cr0.5)2-xNix (x = 0.0 to about 1.4) on the initial **activation** characteristics, P-**C**-T property, and microstructure have been investigated. It was found that Ni can substitute into this **AB2** family of compds. which have the essentially single C14 Laves structure between x = 0.0 and about 1.0 Ni and become the C15 Laves structure between x = 1.0 and about 1.4 Ni. All the compns. were easily activated at 40.degree. and 1.0 MPa H2 pressure. This family of compds. exhibited high **hydrogen storage** capacity and low hysteresis. The plateau pressures could be raised over two orders of magnitude by the increase of Ni-content. The F-treatment, which has been successfully used on **AB5** compds., such as LaNi4.7Al0.3, did not show beneficial effects on this **AB2** family of compds.

CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56
ST **hydrogen absorption** titanium zirconium manganese chromium; fluoride treatment Laves alloy hydriding behavior
IT 1333-74-0, Hydrogen, processes 7782-41-4, Fluorine, processes
(effects of Ni-substitution and F-treatment on the hydriding behaviors and microstructures of titanium-zirconium-manganese-chromium **AB2**-compd.)
IT 161468-06-0 166892-44-0 166892-45-1 166892-46-2 166892-47-3 166892-48-4 173866-16-5 173866-17-6
(effects of Ni-substitution and F-treatment on the hydriding behaviors and microstructures of titanium-zirconium-manganese-chromium **AB2**-compd.)

L70 ANSWER 21 OF 23 HCA COPYRIGHT 2004 ACS on STN
121:113262 Optimization of composition and structure of metal-hydride electrodes. Petrov, Konstantin; Rostami, Abbas A.; Visintin, Arnaldo; Srinivasan, Supramaniam (Cent. Electrochem. Systems Hydrogen Res., Texas A and M Univ. System, College Station, TX, 77843-3402, USA). Journal of the Electrochemical Society, 141(7), 1747-50 (English) 1994. CODEN: JESOAN. ISSN: 0013-4651.
AB This paper focuses on investigations to improve the capacity and cycle life of a Ni/metal hydride (MHx) battery by optimization of the compn. (i.e., active material and additive) and structure of the metal hydride electrode. Teflonized carbons, Vulcan-XC-72, **Norit**-NK, and acetylene black (XC-35) were evaluated as additive materials for the **AB2**- and **AB5**-type alloys. Expts. were conducted to det. the optimum (a) amt. of hydride material in the electrode, (b) ratio of the amt. of hydride material to that of electronically conducting material (**C** or acetylene **black**), and (**c**) percentage of Teflon in the metal hydride electrode. The discharge capacity and cycle life depended on both the type and amt. of the additive material. The teflonized C additive increased the stability of the electrode over that of an electrode with Cu powder as the additive. The increase in stability and cycle life is attributed to the flexible, electronically conducting three-dimensional C-Teflon network which permits its intimate and stable contact with the active alloy particles. The additive Vulcan-XC-72 enhances the capacity of the electrode above that of an electrode with acetylene black or Cu. The behavior of the electrodes, in respect to the effect of the additive, was similar with the **AB2** and **AB5** alloys as active materials.
IT **7440-44-0**, Carbon, uses
(anodes contg., metal hydride, compn. and structure of, optimization of, for nickel batteries)
RN 7440-44-0 HCA
CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

IT **Carbon black**, uses
(anodes contg., metal hydride, compn. and structure of, optimization of, for nickel batteries)

IT Anodes
(battery, **hydrogen-absorbing** nickel-based alloys, compn. and structure of, optimization of)

IT **7440-44-0**, Carbon, uses
(anodes contg., metal hydride, compn. and structure of, optimization of, for nickel batteries)

IT 156912-23-1 156912-24-2
(**hydrogen-absorbing**, anodes, compn. and structure of, optimization of, for nickel batteries)

L70 ANSWER 22 OF 23 HCA COPYRIGHT 2004 ACS on STN

118:216587 **Hydrogen-absorbing** alloy anodes and their manufacture. Moriwaki, Yoshio; Yamamura, Koji; Tsuji, Yoichiro; Fujiwara, Shozo; Iwaki, Tsutomu (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 05013075 A2 19930122 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1991-162655 19910703.

AB The anodes comprise a mixt. of powd. **H-absorbing** alloys of predetd. particle size bonded by short, elec. conductive fibers and a polymer binder applied on porous conductive substrates. The alloy particles are preferably Zr or Ni **AB2**-type Laves-phase alloys having av. diam. .ltoreq.40 .mu.m mixed with metal or carbon fibers; the binder is selected from poly(vinyl alc.), thermoplastic elastomers, CMC, and fluoropolymer and is optionally used with a hydrophilic powder having av. particle diam. .ltoreq.10 .mu.m. The anodes are manufd. by kneading the mixt. with a solvent, applying the paste on the substrates, and drying. These anodes have high strength and render batteries with good high-rate charging and discharging performance and long cycle life.

IT **7440-44-0P**
(carbon fibers, elec. conductor, in **hydrogen-absorbing** anode manuf., for batteries)

RN 7440-44-0 HCA

CN Carbon (7CI, 8CI, 9CI) (CA INDEX NAME)

C

IC ICM H01M004-24

ICS H01M004-26
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST battery **hydrogen absorbing** alloy anode; binder **hydrogen absorbing** alloy anode; conductive fiber **hydrogen absorbing** anode
IT Fluoropolymers
(binders contg., in **hydrogen-absorbing** anode manuf., for batteries)
IT Carbon fibers, uses
Metallic fibers
(elec. conductor, in **hydrogen-absorbing** anode manuf., for batteries)
IT Anodes
(battery, **hydrogen-absorbing** alloy, manuf. of, binder and elec. conductive fibers in)
IT 9002-89-5, Poly(vinyl alcohol) 9004-32-4, CMC
(binders contg., in **hydrogen-absorbing** anode manuf., for batteries)
IT **7440-44-0P**
(carbon fibers, elec. conductor, in **hydrogen-absorbing** anode manuf., for batteries)
IT 147301-31-3P
(**hydrogen-absorbing**, anodes, binders and conductive fibers in manuf. of, for batteries)
IT 7440-02-0P, Nickel, uses
(powd., **hydrogen-absorbing** alloy anodes contg., manuf. of, for batteries)

L70 ANSWER 23 OF 23 HCA COPYRIGHT 2004 ACS on STN
102:121945 **AB5**-catalyzed hydrogen evolution cathodes. Hall, D. E.; Shepard, V. R., Jr. (Res. Cent., Inco Alloy Prod., Suffern, NY, 10901, USA). International Journal of Hydrogen Energy, 9(12), 1005-9 (English) 1984. CODEN: IJHEDX. ISSN: 0360-3199.
AB The **AB5** metal compds. (e.g. LaNi4.7Al0.3) are highly efficient H evolution electrocatalysts in alk. electrolytes. Three types of **AB5**-catalyzed cathode structures were made, using the hydride-forming **AB5** compds. in particulate form. Plastic-bonded cathodes contg. >90 wt. % **AB5** (finished-wt. basis) were the most efficient, giving H evolution overpotentials (.eta.H2) of 0.05 V at 200 mA/cm2. However, they tended to swell and shed material during electrolysis. Pressed, sintered cathodes contg. 40-70 wt. % catalyst in a Ni binder gave .eta.H2 .apprx. 0.08 V; catalyst retention was excellent. Porous, sintered cathode coatings were made with 30-70 wt. % **AB5** catalyst loadings. Their overpotentials were similar to those of the pressed, sintered cathodes. However, at catalyst loadings .ltorsim.40 wt. %, high overpotentials characteristic of the Ni binder were obsd. The

structural and electrochem. properties of the 3 **AB5**
-catalyzed cathodes are discussed.
CC 72-2 (Electrochemistry)
IT **Carbon black**, uses and miscellaneous
(lanthanum intermetallic compd. electrocatalyst contg., for
hydrogen evolution)
IT **Absorption**
(of **hydrogen**, by lanthanum intermetallic compds.,
pressure in relation to)
IT 51312-66-4 60241-02-3
(**absorption** by, of **hydrogen**, pressure in
relation to)